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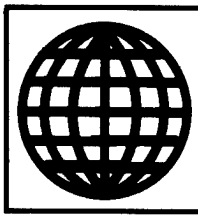

FOREIGN BROADCAST INFORMATION SERVICE

JPRS Report

Science & Technology

Central Eurasia: Engineering & Equipment

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Reports of Radioactive Waste Dumping in Arctic Denied

LD0309181692 Moscow ITAR-TASS in English 1137 GMT 3 Sep 92

[By ITAR-TASS correspondent Vasiliy Belousov; for earlier report, see JPRS-UEQ-92-011, 6 Oct 92, pp 31-32]

[Text] Murmansk, September 3 (TASS)—The local newspaper SOVETSKIY MURMANSK today denied reports by the Norwegian press that the ship "Serebryanka," servicing Russian atomic-propelled vessels, has left Murmansk for Novaya Zemlya to dump liquid radioactive wastes there.

"The "Serebryanka" has, indeed, left for Novaya Zemlya, but for quite another purpose: It will deliver equipment to a geological prospecting expedition, which is conducting surveys to site there an enterprise for burying radioactive wastes, accumulated in Murmansk and Archangel regions," the newspaper says. "As to liquid wastes from nuclear-powered icebreakers of the local shipping administration, their dumping into the sea was stopped back in 1986."

The correctness of the Murmansk newspaper's report was confirmed to ITAR-TASS by officials of the local authorities.

Nordics Worried About Arctic Nuclear Dumping

92WN0763B Stockholm SVENSKA DAGBLADDET in Swedish 27 Aug 92 p 11

[Article by Elisabeth Crona: "Nordic Cooperation on Arctic Environment: Atomic Waste in the Barents Sea Makes Norway Uneasy"]

[Text] Nordic foreign affairs ministers gave a clear signal today in favor of a new arctic cooperation based on a Norwegian initiative. It will take the form of a conference on 11 January between the Scandinavian countries and Russia, which all parties have now agreed to.

The cooperative effort will primarily deal with the environment and nuclear safety. Atomic waste in the Barents Sea is making the Norwegians very uneasy. They have already established contact with the Russians in that area, but they wish to have a Nordic framework for work in the future.

A Flowering Arctic

It is no accident that Norwegian Foreign Affairs Minister Thorvald Stoltenberg (Labor Party) placed the meeting with his Nordic colleagues in exotic Spitsbergen, 1200 miles from Oslo. For some months now he has been discoursing on the arctic region, conjuring up a vision of a blossoming future and the possibility of gradually establishing new trade routes between Asia and Europe over the northern route.

There are also strong domestic political grounds for pursuing this issue and for driving it home with the other Nordic governments: He is working to get northern Norway, with its adamant opposition to the EC, to see a future in a "regional Europe," an arctic Norway that can receive economic support from the EC's structural funds.

In the same vein, Prime Minister Gro Harlem Brundtland concluded recently, at the meeting of prime ministers in Bornholm, that the Swedish response was positive because it pointed up the potential for getting EC support for arctic agriculture.

Swedish Foreign Affairs Minister Margaretha af Ugglas responded positively to the Norwegian initiative. While the chartered flight circled over "Svalbard's endless, wilderness expanses in brown and snow white," she told SVENSKA DAGBLADET that the Ministry of Foreign Affairs has done its own analysis of this region's burgeoning potential. Very soon she will appoint an ambassador to the arctic, Jan Romare, and in the fall she intends to hold a seminar in order to prepare for the January meeting in Kirkenes.

Evident Interest

The Nordic political interest is very evident. Some weeks before the meeting of the foreign affairs ministers, the presidium of the Nordic Council held its meeting—also on Spitsbergen, and also on the Labor Party's initiative. Norwegians have long felt that Nordic discussion dwelt too much upon the Baltic region and on the environmental destruction of the Baltic Sea. During the same period there were numerous reports of an enormous dumping of atomic waste into the Barents Sea by the Soviets.

However, in Moscow, the Kola Penninsula, despite the severe damage to its environment, has a hard time getting included into the 20 areas given highest priority for environmental investment. The Norwegians are currently hoping that international attention will jockey environmental work on Kola into a better position.

According to the Norwegian plan, which will be further developed during the autumn months, cooperation on the arctic will first and foremost concentrate on stocktaking and investigation of nuclear safety in the area.

It is necessary to take steps now, during the political thaw, to create civilian contacts with the Russians. Military harbors should be converted to accommodate civilian cargo, a telephone network must be developed, and industries and railroads built. This is the shape of Thorvald Stoltenberg's vision. And its future includes an opening of the North East passage.

Norway Views Environmental Threats From Russia's Nuclear Waste

PM0909153692 Oslo AFTENPOSTEN in Norwegian 3 Sep 92 p 13

[Article by Ole Mathismoen: "The Catastrophe Is Already Taking Place"]

[Text] Before the collapse of the Soviet Union the West had a nightmare about the dumping and dangerous storage of atomic waste. Now a reality is being revealed that makes Chernobyl look like a picnic.

Environment Ministry Under Secretary Jan Thompson has no doubts: "This is definitely one of the biggest environmental threats to Norway."

At present a very special research voyage is taking place in the Barents Sea and the Kara Sea. Norwegian and Russian researchers are there to measure radioactivity in areas

which were once hermetically sealed to the West. The world is waiting tensely for the results. For decades solid and liquid radioactive waste was dumped and 120 nuclear bombs were tested on Novaya Zemlya, which separates the two seas. Enormous quantities of radioactive waste have been stored on the mainland.

The question the researchers want an answer to is whether there is more radioactivity in the sea than natural background levels, and whether one of the world's cleanest and most fish-rich seas could find itself in danger in the future. The voyage is the first attemtpt to tackle a gigantic problem which the Bellona Environmental Foundation in collaboration with Russian researchers has begun to shed light on.

After a series of visits to areas that were previously closed Bellona has turned the spotlight on an incredibly big and frightening radioactive garbage heap. Together with several nuclear power stations in poor condition this nuclear waste represents a threat which one day could deal Norway a deadly blow.

Bellona's Frederic Hauge has visited Mayak, and is working full-time on the Russian nuclear threat in the north:

"I dare not think about how big a threat this actually is," he said.

The military nuclear complex at Chelyabinsk in the southern Urals is undoubtedly the biggest threat, even though the distance to Norway is great. In terms of radioactivity almost one quarter of Russia's nuclear waste is stored here. Leaks or accidents here would bring radioactive water via the River Checha to the River Ob and out into the Kara Sea which is the feeding ground of the cod in the Barents Sea.

—Some 188 Russian naval vessels in the Northern Fleet are powered by 229 nuclear reactors and sail northern waters. Officially all waste is stored on land by the Litsa Fjord, 40 km from Finnmark. But liquid waste of low radioactivity is still being dumped from special ships in the Barents Sea. The Northern Fleet and the missile bases in the regions have around 3,500 nuclear warheads stockpiled.

—In April 1989 the nuclear submarine Komsomolets sank off Bjornoya. The partially shattered submarine lies at a depth of 1,680 meters and contains radioactivity corresponding to 10 percent of that released at Chernobyl, and two nuclear charges of plutonium.

—In the Murmansk Fjord several dozen old nuclear submarines are lying rusting. Their nuclear reactors have not been removed.

—On Novaya Zemlya 120 nuclear bombs have been detonated since 1957—86 in the atmosphere and the rest underground. Russia's self-imposed moratorium on nuclear tests runs out in October. In Russia consideration is being given to whether 5,000 nuclear warheads that are now surplus to requirements since the disarmament agreements should be destroyed in nuclear explosions. The last test took place on 24 October 1990 and radioactive gases were detected in Sweden.

—From 1963 to 1986 radioactive waste was continually dumped in the Kara Sea from the special ship, the Lepse. A total of 11,200 containers containing 0.5 to 1 cubic meter of waste are believed to have been dumped. In the 1960's a boat fully loaded with nuclear waste was sunk and waste from a fire on the nuclear icebreaker Lenin was dumped directly into the Kara Sea.

—Cooling water containing a low level of radioactivity is still being dumped in the Barents Sea from the special ships Sebryanka and Amor which collect waste from the submarines.

—Waste of both high and low radioactivity is stored at a number of locations on land on the Kola Peninsula, which has the world's highest concentration of nuclear reactors. In Murmansk harbor there are four old ships fully loaded with radioactive waste. There are plans for a new central store for all nuclear waste on the Kola Peninsula.

—The nuclear power station at Polyarnyye Zori on the Kola Peninsula has four reactors of the Greifswald type and has had several operational problems. Its waste is packed into steel barrels lined with concrete and is stored in sheds.

—Radioactive waste from hospitals and civilian industry on the Kola Peninsula is stored 43 km from Murmansk on the road to Norway. The waste is packed in plastic and stored in concrete enclosures that are poorly protected.

There are also enormous waste dumps near the city of Tomsk on the River Ob. The waste products from plutonium production in Mayak are deadly, and the production of plutonium from used fuel rods is continuing at the plant. In the 1950's and 1960's waste was dumped directly in the rivers. An accidental explosion in 1957 cause the spread of radiation corresponding to ten Chernobyls, and radioactive dust from the swampy Lake Karachay was stirred up and spread in the area. Radioactive waste in still being dumped in the enclosed Lake Karachay and radioactivity is spreading through the groundwater at the rate of 80 meters per year and coming dangerously close to the Ob river system. Karachay contains radioactivity equivalent to 500 Chernobyls. The lake's plutonium content is particularly worrying.

At Mayak an artificial lake containing 400 million cubic meters of radioactive water has been created. The containing walls are in poor condition, the water is rising, and there are fears that there will be leaks from the reservoirs out into the river system. Also over 100 tanks are being stored. These contain several thousand cubic meters of highly radioactive waste which requires constant cooling to prevent explosion.

In the first instance the Mayak threat is a threat to a local population which has long topped the cancer league. But without large-scale and expensive safety measures Mayak could become a gigantic problem for Norway.

Russian-Norwegian Expedition Says Radiation Level in Kara Sea Low

LD1209164392 Moscow ITAR-TASS in English 1416 GMT 11 Sep 92

[By ITAR-TASS correspondent Valeriy Loskutov]

[Text] Oslo, August 11 (TASS)—The level of water radiation in the Kara Sea east of the Novaya Zemlya Archipelago is very low and within the established limits, Lars Foejun, head of a Russian-Norwegian expedition told a local news agency here on Friday.

The expedition completed a three-week trip on the Viktor Buinitsky ship to northern latitudes and returned to the port of Kirkenes on Thursday.

Russian and Norwegian specialists in sea investigations and nuclear safety planned to look for sunken radioactive waste in the area of Novaya Zemlya and determine the general ecological situation in the region.

According to Foejun, Russian authorities did not permit the expedition to visit three bays on the eastern part of the Archipelago where, as local environmental organisations claim, there is the main sea junkyard of used nuclear reactors from icebreakers and submarines.

"If all this is on the sea bottom," Foejun noted, "water samples taken for the content of Caesium-137 show that there is no radioactive leakage for the time being.

"The level of radioactive water in the Kara Sea is not higher than in the Barents Sea or Oslo Fjord and is only a tenth of the Baltic Sea radiation background. The higher level of the Baltic Sea's radiation pollution is more likely explained by the after effects of the Chernobyl disaster."

The expedition collected rich scientific material, including water and soil samples from various depths. Russian and Norwegian specialists will painstakingly examine the samples over the next year.

It is planned to publish the final results of the joint expedition and forward them to an international expert commission.

Russian-Finnish Seminar Examines Nuclear Waste Issue

Yablokov on Waste Ban

PM2109153392 Moscow ROSSIYSKAYA GAZETA in Russian 17 Sep 92 First Edition p 7

[Sergey Pankratov report under the rubric "Nuclear Waste": "Russia Could Become a Scrap Heap. Russian Parliamentarians Should See That It Does Not"]

[Excerpts] Helsinki—It would seem that the Russian parliament has approached this problem single-mindedly by deciding to ban the import and burial of nuclear power industry waste from other states on the republic's territory before the adoption of the appropriate law. The law, in its turn, is to prevent the country being turned into a dump for radioactive waste.

However, a joint seminar of Russian and Finnish parliamentarians held in Helsinki gives every reason to suggest that during the examination of the draft law at the fall session, representatives of our nuclear energy complex will put pressure on Russian deputies in order to get the amendments they want. [passage omitted]

Out of all that was heard at the seminar, it was the announcement by Academician Aleksey Yablokov that in August of this year the Russian Government allowed, by way of an exception, a train carrying waste from East European AES's [nuclear electric power stations] to be admitted for burial purposes that attracted special attention.

What does Mr. Yablokov think of this decision of the government's? Will Russia accept radioactive waste from Finland? A hail of questions descended on the head of our parliamentary delegation during the recess. I will cite only excerpts from this impromptu press conference.

Yablokov: The Soviet Union has left us an inheritance in the shape of agreements with other states. Having declared itself the successor of the former USSR, Russia must meet the obligations it has assumed, including in the receipt of radioactive waste. As for Finland, if the agreement to export nuclear fuel was signed at an intergovernmental level, there is a 99-percent guarantee that it will be fulfilled.

Questioner: What then is to become of the Russian parliament's resolution?

Yablokov: All that is needed is a special decision of the Russian Government. And if there was one on the countries of East Europe, I do not see any reason why it should not adopt one on Finland also.

Questioner: But do you not consider, as a close adviser of President Yeltsin, that it is time to halt the creation of a huge radioactive waste dump on the territory of your country?

Yablokov: In principle, I think that we can organize the reprocessing of nuclear fuel if we observe ecological norms. Very keen debates are under way on this score in the relevant commissions of the Russian parliament. At the same time, as the president's adviser, I will note that he is ready to agree to any law adopted in this sphere by the Russian Supreme Soviet... [Yablokov ends]

One of the Finnish participants in the seminar remarked that Russian parliamentarians will have to adopt a decision of a scientific rather than a political character on the question. After all, the deputies' basic discussion will revolve around the problem of whether to regard spent nuclear fuel as waste or as a product requiring reprocessing for further use.

One further reason why the draft law as it now stands could be subjected to substantial amendment became clear during the Russian-Finnish seminar. We are being promised big money for the possibility of burying nuclear waste on Russian territory. Academician Yablokov mentioned in this connection a promising offer from Korea...

Right now one thing is clear: If the law is adopted in its latest interpretation, Russia will open its borders to radioactive waste from all over the world. Whatever is said about reprocessing, byproduct residues will ultimately poison our soil. And this is already politics, and big-league politics at that.

Joint Efforts Promised

PM2109154192 Moscow IZVESTIYA in Russian 17 Sep 92 Morning Edition p 5

[Marat Zubko report: "Nuclear Waste Problem Does Not Recognize National Borders"]

[Text] Helsinki—"The problem of radioactive waste does not recognize national borders. We must jointly ensure that the environment is ecologically clean for future generations," this was how Finnish Parliament Deputy P. Paasio explained the significance of the seminar held in the Finnish parliament on issues relating to burying nuclear waste on former USSR territory.

Knowledgeable people took part in the discussion. On the Russian side there was Russian presidential adviser Academician A. Yablokov, A. Poryadin, deputy minister for the ecology and natural resources, Supreme Soviet Deputy A. Butorin, and various experts.

What specifically was the point at issue? For example, the fact that a new Russian law now bans the acceptance or burying in Russia of waste from other countries, whereas this was practiced in the former USSR. However, bearing in mind the existence of interstate agreements, waste is nevertheless arriving in our country by decision of the government. From both Finland and Hungary.

There was also discussion about the fact that a nationwide map of regions damaged by radiation is currently being drawn up in Russia, information on which will be presented to the country's population at the end of the year. Inventorying of all enterprises that use radioactive substances is also being carried out, and an all-Russian safety signaling system is also being established.

Academician A. Yablokov's statement that in his personal opinion it would be possible to abandon the use of nuclear power stations altogether caused a sensation. According to him, they could be replaced by powerful gas turbine units designed for military needs, which, after some alteration, could generate enormous amounts of electricity and heat.

For their part, the Finnish parliamentarians noted that they are still concerned about the state of the AES's [nuclear electric power stations] at Sosnovyy Bor and on the Kola Peninsula, the uranium enriching combine in Estonia, and other installations. They reminded the Russians that at their latest meeting in Spitsbergen, the foreign ministers of North European countries submitted a proposal to carry out a detailed inspection of all AES's in East Europe.

J. Blomberg, representative of the Finnish Foreign Policy Department, notified those attending the seminar that this year Finland has earmarked 6.4 million markkas for necessary modernization of the Sosnovyy Bor AES, and that next year another 12 million markkas will be allocated for this purpose.

Russians Bar Swedish Scientists From Nuclear Reactor-Waste Dump Sites

LD0609125392 Stockholm Sveriges Radio Network in Swedish 1030 GMT 6 Sep 92

[Text] Russian authorities are refusing entry to Norwegian scientists to study areas which are assumed to be dumps for nuclear reactors and radioactive waste. The Norwegians suspect that the Russians have dumped a large number of nuclear reactors in the Arctic. Here is a report from Oslo:

[Per Ritzler] At least 13 reactors have been dumped, some 10 of them in three bays east of Novaya Zemlya. Three of the reactors come from the atomic-powered icebreaker Lenin, while the other reactors presumably are from atomic-powered submarines. In addition, the Russians are supposed to have dumped a large number of barrels or small containers holding radioactive waste into the sea. The reports range from 13,000 to 17,000 barrels with low radioactive waste.

In a conversation this morning, Magne Roeed of the Environment Ministry's international department here in Oslo says that it has not been possible to obtain confirmation about the reports of the Russian dumping, originating largely from Greenpeace, but that the Russian authorities are not denying facts when confronted with them.

Roeed is also chairman of the group of experts which has negotiated a research project between Russian and Norwegian authorities, which is currently in progress. The Russian research vessel Viktor Buynitskiy, which has a number of Norwegian researchers on board, together with a representative of the International Atomic Energy Agency, will in one week's time complete work on mapping out the extent of the Russians' dumping of nuclear waste in the Barents Sea, among others, and the possible consequences of the waste for the seabed and marine life.

It is also the research project's ambition to take a closer look and map out particular areas where reactors and other nuclear waste dangerous to the environment have been dumped. However, the Russian authorities have said no to this. The researchers have not been granted access to the three bays east of Novaya Zemlya where some 10 reactors are supposed to have been dumped into the sea. The Environment Ministry in Oslo explains the Russian 'no' partly by referring to the heavy Russian bureaucracy with several decisionmaking stages with which they have to deal and the slowness among the Russian military to adopt openness.

At the Nordic environment ministers' meeting in Kirkenes this past week criticism was voiced against the Russian-Norwegian research project, among other things because the researchers were denied access to some Russian waters.

Magne Roeed thinks that the project has achieved some success. Roeed and the ministry want to hold back on further reports that add to those that have been published until the researchers have collected and processed the data. When the research work is completed in a week's time, the intent is to proceed with attempts to seek out those areas where the Russians have dumped radioactive waste and reactors in order to define them more closely.

French TV Examines Legacy of Soviet Nuclear 'Crimes'

92WN0769A Moscow IZVESTIYA in Russian 5 Sep 92 Morning Edition p 6

[Article by Yuriy Kovalenko, IZVESTIYA correspondent, Paris: "On the Trail of Nuclear Catastrophes: The Investigation of French Television Journalists Carried Out in Russia and Kazakhstan"]

[Text] They called their trip to the former Soviet Union "A Journey on the Trail of Nuclear Crimes." These trails they have discovered everywhere—in Moscow and Chelyabinsk, Yekaterinburg, and Semipalatinsk, in the Russian and Kazakh hamlets forgotten by the authorities, in the forests and rivers, in hospitals and factories.

The trip resulted in a 52-minute film, which will be shown on 23 September in France by the FR-3 television station within the framework of the popular weekly broadcast "March of the Century". Its authors are the three well-known French television journalists Erve Bryuzini, Dominique Ters, and Jean-Francois Renu, which were accompanied by the scientist Vladimir Lelekov, who for 20 years worked in the Institute for Atomic Energy imeni Kurchatov.

In this film—at least for the inhabitants of the former Soviet Union—to all appearances, there are no sensations of any kind. Most likely, our television and press have already talked about everything in the last few years. And nevertheless, the blood turns cold when they show the newly-born cripples and the sick children where they conducted tests for many years. When you listen to the story of the man who during 2 years of military service had to measure the level of radiation right away after the nuclear explosion. When you see the 18-year old girl who works in a plant whose radiation level exceeds the norm ten-fold. "But where to disappear to?" she asks expressing doom.

"Similarly to how the forest is not visible for the trees, so after Chernobyl it was impossible for a long time to recognize the real dimensions of the nuclear catastrophe, to which your country has fallen a victim during the past 40 years," says Dominique Ters after viewing the film arranged for your [as published] correspondent. "And up to now, its consequences remain unknown. The Soviet authorities knew how to conceal their crimes. All of them were perpetrated behind closed doors, in cities and settlements to which access was prohibited. Without any witnesses. Or almost without them."

Today, it goes without saying, it is much more simple to find witnesses than a few years ago. One of them, Viktor Alekseyevich Galoshchalov (all Russian surnames were recorded by the French by ear, and for this reason, regrettably, they may contain errors), during 1962 to 1963 served at the nuclear testing range in Semipalatinsk, where in those two years almost 100 tests were conducted. Together with other soldiers, he had to measure the radiation right away after the explosion. "We were guinea-pigs," he says.

Guinea-pigs, as it turned out, the French journalists think, were also the inhabitants of near-by villages in the region where in 40 years 689 explosions were conducted. "We did not think," the Kazakh physician says, "that one could act in such a way with respect to one's people. . . ."

35 years ago, the nuclear waste deposit not far from Chelyabinsk exploded, and as a result a minimum of 270,000 people found themselves in a radioactive cloud. To this day, the public does not fully know what happened at that time, and up to now the consequences of the explosion have not been eliminated.

. . . an enormous open deposit of uranium ore in Aktau (Kazakhstan), which is being exploited since 1964. Kazakh uranium is one of the cheapest and is being successfully exported. The director of the factory for its enrichment, Aleksandr Yakovlev, asserts that the level of radiation in his enterprise is five times lower than the admissible medical level and that the workers have excellent protection from their simple dark-blue overalls. However, the instruments of the Parisian journalists showed 5,700 microroentgen, which, in their words, is 230 times higher than the level that exists in French nuclear power stations.

"These are enormous and inadmissible doses," is the commentary on the readings from people's deputy Nikolay Valitskiy, who himself has been working for almost 30 years in this factory. "The workers work here and have absolutely no information of any kind about the dosages of irradiation to which they are subjected. This is inhumane. . . . Yes, people are silent. We have become used to live like this. . . ."

For the burial of radioactive waste from the factory, beginning in 1970, they use the lake that is situated not far from the Caspian Sea, whose water in its turn is threatened with poisoning. A new Caspian Chernobyl may happen, N. Valitskiy warns, as a result the whole region will prove to be infected.

Is it possible that nothing has changed here during the past years, the Frenchmen want to know. "We have been told that you have democracy now."

"You have seen this democracy," comes the answer of one of the participants of the film, lieutenant-colonel Tukin, who is fighting for the rights of the radiation victims. "Where is this democracy? Some people have replaced others. As far as the new structures are concerned, they are quite unable to do anything. Unfortunately, they have become as corrupt as those which existed previously. And sometimes even more so."

"This film and broadcast which we are preparing," Erve Bryuzini tells me, "is a warning, above all, to all Western countries. What has taken place in the former Soviet Union is directly relevant also to France and to the United States. When the explosion occurred in Chelyabinsk, the CIA and the French secret services found out about it at once. But the authorities, which were informed by them, were silent, no one reacted. Why? Information about the nuclear explosion would have alarmed the Western public and thereby would have threatened our nuclear program."

"That was the silence of accomplices," E. Bryuzini continues. "For this reason, the West bears part of the responsibility for what happened in your country. Not long ago, the director of the CIA, Gates, declared that the radioactive pollution in the CIS is a genuine catastrophe. For its elimination, in his words, tens of billions of dollars and many decades are needed. We want to ask Gates, whom we invited to our broadcast: Why were you silent at that time?"

"Yes, nuclear punctures have occurred also in the West," E. Bryuzini remarks, "but in contrast to the USSR, our public found out about them more frequently. In your country, the victims themselves had to sign not to divulge the secret, they assumed the obligation not to tell anyone

about their approaching death. . . . I am struck by the fact that up to now your population does not understand all the dangers connected with radiation. One of the directors of the Siberian Division of the Academy of Sciences quite seriously tried to convince us: The people cannot be told anything since we cannot do anything to help it. Such information, in his opinion, will only call forth panic and stresses and nothing more. But even if this is so, it is impossible to conceal the truth. Concealing it from people, you will never find the solution of the problem."

Japanese TV Highlights Russian Navy's Negligence in Nuclear Disposal

OW1609103692 Tokyo NHK General Television Network in Japanese 1200 GMT 14 Sep 92

[Editorial Report] Tokyo NHK General Television Network in Japanese in its "NHK 21 News" program at 1200 GMT on 14 September carries a report relating to problems with the "slovenly" methods the Russian Navy uses to dispose of its scrapped nuclear submarines.

Newscaster Tadashi Sonoda begins the report: "Now we would like to report to you regarding problems with nuclear controls, as practiced by the former Soviet Union. The carelessness of the former Soviet Union's control of nuclear arms and nuclear reactors is turning into an international issue—for instance last spring, it was discovered that several thousand tons of nuclear waste, as well as nuclear submarines with nuclear fuel in them, were abandoned south of the Arctic Ocean. While such is the situation, NHK recently obtained a photograph of a nuclear submarine which was left abandoned in the water since it exploded in an accident at a port near Vladivostok 7 years ago.

"This accident was caused by the explosion of a nuclear reactor. It happened in a nuclear submarine repair yard near Vladivostok on 10 August 1985. Ten men were killed and adjacent areas were contaminated with radiation."

Video cuts to a black-and-white photo of a submarine, in front of which stands a uniformed soldier with what looks like a geiger counter.

While the picture is on, the voice of an announcer says: "This is a photograph of a nuclear submarine whose reactor exploded in an accident. A steel deck which should have been on top of the nuclear reactor was blown off in the explosion. The submarine was left abandoned with a large hole in it."

Video alternately shows scenes of the repair yard as it looks now and maps showing the general area of the repair yard—the announcer continues to report: "The explosion occurred seven years ago in August 1985, while in the process of changing nuclear fuel at a repair yard in (Chajima) Bay between Vladivostok and Nakhodka. The accident killed 10 and resulted in a large leakage of radiation."

"An area 6 km long and 1.5 km wide southwest of the site of the accident has been off limits until now, and the details of the accident are not known. This photo was taken in December of last year, and the submarine was shown abandoned, with its nuclear reactor left inside. In the port of Vladivostok, other nuclear submarines that have been involved in accidents are simply docked with buoys attached to them. It is clear that the controls practiced by the Russian Pacific Fleet are extremely slovenly."

Newscaster Sonoda returns to video, and says: "According to NHK's Vladivostok office, this is not the only submarine which had an accident involving an explosion which was left abandoned. While the East and the West proceed with efforts to reduce nuclear arms, what are they doing about nuclear submarines which are being scrapped because of their age? You will hear a report on that question from reporter Yamauchi."

Reporter Yamauchi himself does not appear on screen, but his voice explains, while video shows scenes of a shipyard: "This is the only yard in the Far East where the dismantling of nuclear submarines is done, and this is not so far away from the site where that submarine exploded. Right now in this yard, operations are underway to take nuclear reactors out of nuclear submarines that are being scrapped. The dismantling is done according to the following steps—dissecting the submarines into several parts, taking nuclear fuel out of the parts holding the nuclear reactor, and then sealing the reactors. The reactors are then taken out and docked at sea, floating with buoys attached, just as is done with other parts.

"The problem is that the Pacific Fleet has no facilities for burying such nuclear reactors. This yard is supposed to dismantle a total of 35 nuclear submarines, but so far has been able to dismantle only 18—or about half of them. Because of serious financial difficulties, it can dismantle only one per year. Consequently, the remaining 17 submarines are waiting for their turn with nuclear fuel loaded on board, and in the meantime more than 1,200 security personnel have to be assigned for the security of the nuclear reactors on these submarines. These problems of financial difficulties and manpower for security are making safety controls for nuclear reactors very difficult."

Video then shows Smirnov, the Russian Pacific Fleet Submarine Division head, talking in an interview with NHK [translated from Japanese subtitles]: "We are now constructing facilities to store nuclear reactors which have been removed. But until these facilities are completed, there is no other choice but to leave the separated nuclear reactors floating at sea."

The black-and-white photo of the submarine involved in the explosion briefly returns to the screen. While the photo is on screen the announcer continues speaking: "Reports on accidents involving submarines or on how the nuclear reactors are disposed of are almost never given to residents in general. Neither detailed investigations on radiation contamination nor physical checkups on residents have been done."

Video cuts to scenes of interviews. A Russian woman says [translated from subtitles given in Japanese]: "I have learned about the accident involving the explosion of the nuclear reactor for the first time, and I am very much concerned about possible effects from it."

Another Russian woman says: "The disposal of nuclear reactors should be done more cautiously. They are doing things haphazardly."

A man identified as Tsoi, director of the Coastal Area Environmental Center insists: "It is very dangerous to store nuclear reactors at sea. That is because there is the possibility that radiation contamination will spread very rapidly. The radiation will contaminate living things in the sea, thus affecting the human beings that eat them. Radiation contamination thus affects not only the environment but also human beings."

Video switches to a map of the Russian Far East area, and the announcer continues to explain: "In the Far East there are four places where dismantled nuclear submarines are left abandoned with nuclear reactors on them—at the outskirts of Vladisvostok, Kamchatka, the Khabarovsk area and so forth."

Video shows a uniformed Russian officer identified as Captain Chelevkov in an interview. The officer says [translated from Japanese subtitles]: "In the Russian Pacific Fleet, the problem of manpower shortages has become serious. The state is such that we do not have enough men for assignment to dismantle nuclear submarines. As such, it is possible that the disposal of radioactive wastes will become even more slovenly in the future. We cannot deny the possibility of new explosions and radiation leaks occurring in the future."

Reporter Yamauchi appears on video. Reporting from Vladivostok, he says: "The Russian Pacific Fleet—which has so many nuclear submarines assigned to it—does not even have basic facilities for the disposal of nuclear reactors. This fact can be said to prove that Russia has not adequately prepared to cope with speedy progress in agreements on nuclear arms reductions between the East and the West."

Newscaster Sonoda in the Tokyo studio returns to the screen and says: "What we saw is that the problem of nuclear reactor disposal in the former Soviet Union is something that transcends the capabilities of Russia—one country—by itself."

Germany To Help Remodel Ukrainian Power Plant

92WN0801B Kiev RABOCHAYA GAZETA in Russian 9 Sep 92 p 3

[Unattributed report: "Ukraine-FRG: Cooperation of Power Engineers"]

[Text] An agreement has been signed in Bonn on the fulfillment of a model project for environmental protection, which provides for the reconstruction of the Dobrotvorskiy Heat and Power Plant in Lvov Oblast. From the Ukrainian side the agreement was signed by Ukrainian Minister of Power and Electrification V. F. Sklyarov and Ukrainian ambassador to the FRG I. N. Piskovoy. From the German side, it was signed by the FRG Federal Minister of Environmental Protection, Nature Conservation and Reactor Safety K. Topfer.

The agreement was signed within the framework of programs for replacing nuclear power plants in Ukraine with safer thermal ones. It provides for the assembly of a sulphur purification complex at one of the power production units of the Dobrotvorskiy Power Plant. This will be the first such complex in Ukraine, and in the CIS countries in general. This complex is capable of extracting 85-90 percent of the sulphurous compounds from the spent smoke fumes. The amount of sulphur emissions into the atmosphere will decline by 25,000-27,000 tonnes a year. The air will become much cleaner, and the amount of acid rain will decrease.

The project makes is possible to fully utilize the gypsum obtained during extraction of the sulphur as a raw material for industry and for the production of building materials.

In today's prices, the cost of the equipment, construction and installation work comprises 53 million German marks and approximately 70 million kupons. The German side is providing free aid for the realization of this project in the amount of 17,250,000 German marks.

The operational introduction of the complex for extracting sulphur from the exhaust gas is planned for 1 December 1995.

The parties have expressed satisfaction at the signing of the agreement, and stated their desire to cooperate in the future in the sphere of power engineering and environmental protection.

Scientists Assess Effect of Nuclear Testing on Kuzbass

92WN0815A Moscow SOVETSKAYA ROSSIYA in Russian 29 Sep 92 p 1

[Article by V. Danilov: "Behind the Lines of the Deputy Inquiry: Nuclear Cloud over the Kuzbass"]

[Text] Kemerovo—In answer to the official inquiry of Aman Tuleyev, chairman of the Kemerovo Oblast soviet, concerning the possible influence of the nuclear explosions in Semipalatinsk on the Kuzbass [Kuznetsk Basin], Kazakhstan scientists, members of the "Nevada-Semipalatinsk" international antinuclear movement, gave the following answer.

Three hundred and fifty underground, 26 surface, and 86 air nuclear tests were conducted on the Semipalatinsk nuclear test range. Especially great damage was caused by the surface and air nuclear explosions. Of the 26 surface tests, 13 produced fallout that went far beyond the boundaries of the range. Of the 26 air bursts, 11 crossed the range boundaries. Aerial photographs taken after the explosion of just the first atomic (plutonium) bomb showed that the nuclear cloud reached Kemerovo Oblast. The exposure dosage from this, according to data of I. Chistyakov, a corresponding member of the Academy of Sciences of Kazakhstan, constituted not more than seven rem [roentgen equivalent]. The permissible limit for a person is below 0.5 rem in a year.

According to USSR Cabinet of Ministers Decree of 8 April 1991, an increase in dosage of 0.1 rem per year above the level of the natural and technical radiation background for a given locality allows the right to compensation, benefits, and guarantees, including improved public health service, full-value food, radiation monitoring of the environment, and so forth.

The scientists' answer to A. Tuleyev's inquiry also says that alpha contamination, which increases in activeness over the years, is the most dangerous for a human being,

and that ailments caused by a nuclear source are 10 times stronger in people of the second, third, and subsequent generations. Therefore, the threat of hereditary anomalies increases over the years.

The answer corroborates the validity of the fears of the chairman of the oblast soviet concerning the aftereffects of nuclear tests for the Kuzbass and the justification of his appeal to the government.

Kazakhstan scientists, who are studying the declassified documents on the Semipalatinsk test range, are ready to conduct ecological and medical research in Kemerovo Oblast and to open a regional section here. A.M. Tuleyev has once again turned to the Supreme Soviet and the government, and the president, with a request to allocate 1 million rubles to improve public health service and to deliver food products to people who live in the contaminated zone.

TV Program Features Formerly Secret Nuclear Town Chelyabinsk-70

LD1009220392 Moscow Teleradiokompaniya Ostankino Television First Program Network in Russian 1922 GMT 9 Sep 92

[Editorial report] Moscow Teleradiokompaniya Ostankino Television First Program Network in Russian at 1922 GMT on 9 September, in its "Black Box" program, carries a 40-minute recorded feature called "The Closed City", second in its series "The Secret of Nuclear Weapons."

The program begins with an unidentified correspondent introducing clips from a film produced by Mikhail Romm, "Nine Days of One Year," about a nuclear physicist involved in secret work on a nuclear accelerator to achieve thermonuclear synthesis and who ended up in a clinic following repeated doses of radiation.

The fate of such scientists was only revealed in May 1992, when a television crew was permitted to go to a secret nuclear town in the Urals, which was long hidden, even from the CIA.

The crew was allotted nine days to make their film about the closed town. On day one, the TV crew flew to a town which is not designated on any Soviet map. Film of the town is accompanied by some rhetorical questions as to what the town is like and whether Russian nuclear physicists will start to go abroad.

In the hotel, the TV crew heard people speaking about a strange "green release" into the atmosphere in one of the squares on the outskirts of the town. Their escort denied knowledge of any such releases.

Academician Yevgeniy Nikolayevich Avrorin, head of the institute in the town, states that the town was set up to create an atomic bomb. A few details of Avrorin's career are given and how he came to work at the secret nuclear center on the shores of Lake Sinara, near Chelyabinsk and Sverdlovsk. The town was like a back-up center in case the major center, Arzamas-16, should need replacement.

Avrorin speaks about the restrictions imposed on the town's residents, such as the need for permission to invite people to the town, to go abroad, telephone calls being tapped, and mail being checked, which he explains as the danger of the proliferation of nuclear weapons and the leaking of state secrets. Nuclear missiles abroad are targeted on this town, and therefore its residents are live targets.

Chelyabinsk-70 or Snezhinsk are the names of the town. The configuration of a snowflake, the town's symbol, is reminiscent of an explosion in its outlines, the correspondent says. The film shows various residential districts of the town.

Avrorin says that people's moods have changed as they realized that they have been responsible for something detrimental to mankind, rather than something important and needed.

V.P. Laushkin, a senior research assistant and candidate of Technical Sciences, and V.M. Ivanov, a leading designer, who composed the town's own anthem, are introduced to the TV crew.

Avrorin gives details of how people were selected for work in this town. There were even many non-party people.

Avrorin is interviewed by the TV crew in Moscow before going on a business trip to the United States. Avrorin says that he can now name his institute, address, and telephone number, although for many years he was bound by secrecy. He says that the type of secrecy varies in Russia and the United States. Avrorin's institute is called the All-Russia Scientific Research Institute of Technical Physics. The video features the meeting of scientists in America.

The institute is said to be responsible for the "green release," which the TV crew manages to film. Video shows a townscape with a misty green outline around the buildings and other objects.

On day two, the TV crew, who do not yet have full permission for their filming, are permitted to film the checkpoint at the entrance to the town, which is surrounded with barbed wire and a ploughed strip and guarded by soldiers with machine guns. Filming of soldiers was restricted, and then prohibited completely.

The unidentified correspondent says: "They took us to Lake (Sumgul). Here there was forbidden zone B, at the end of the forties. Our candidates and doctors of sciences, from among prisoners, of course, together with German scientists who had been taken prisoner, under the leadership of the convicted Academician Timofeyev-Resovskiy, carried out top-secret research on the effect of radiation on live organisms. After all, practically nothing was known of that secret phenomenon then. A dangerous background of radiation has persisted up until our days. One finds dirty spots of contamination in places on the soil." The video shows the lake.

In spite of the contamination, the Orlenok pioneer camp for the children from the town is located on the shores of the lake. A howitzer at the camp is shown, which was once at the epicenter of a nuclear explosion. Video shows the pioneer camp.

The town's main sociologist, V.N. Osipov, candidate of economic sciences, recounts that the town was created over night in 1956 and speaks about the demographic situation in the town.

Kirill Ivanovich Shelkin was the first head of the institute, followed by (Sbabakin) in the sixties, and by Academician Avrorin in the eighties. In the next 5 years, the original scientists, who are in their fifties and make up the town's main potential, will retire. Avrorin speaks about the very small inflow of young specialists to the town, less than 3 percent of new staff are being taken on each year. But the young people in the closed town desire freedom.

A young unidentified man from the town shows the TV crew his cartoons, indicating how the people in the town are like prisoners, bound and gagged, and shows a cartoon of a multi-limbed man with "I will not forget the 1957 explosion" tattooed on his chest.

Academician Avrorin speaks about the danger of a brain drain, about the possibility that people will go and work in the West. In some branches of the Academy of Sciences, almost half of the staff are already working abroad, he says.

On day three of the TV crew's visit to the town, sirens sound while the crew is visiting the town, but people in the streets take no notice. The siren was evidently sounding from the secret production facility.

The "secret production facility" will be dealt with in the next "Black Box" program, the correspondent announces. The date and time of the next segment are not announced.

Nuclear Waste Disposal Hampered by Lack of Funds

92WN0804A Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 1 Aug 92 p 6

[Interview with V. I. Slavgorodskiy, head of the Ministry of Ecology and Bioresources Radiation Ecology Administration, conducted by KAZAKHSTANSKAYA PRAVDA correspondent T. Svan: "Radioactive Waste Burial Site: No Data on Leaks as Yet. Because There is No Money for Study"]

[Text] At the beginning of last month, a scientific-practical seminar was held in the city of Kurchatov on problems of radioecology and radiation safety. This seminar was organized by the Ministry of Science and New Technologies and the Ministry of Ecology and Bioresources. Among the problems examined was that of burying radioactive waste on the territory of Kazakhstan. Seminar participant V. I. SLAVGORODSKIY, who is head of the Ministry of Ecology and Bioresources Radiation Ecology Administration, answered questions posed by our correspondent.

Correspondent: Viktor Ivanovich, let us first define—how much radioactive waste is there in the republic?

Slavgorodskiy: For the present day, 18 cities have been studied. In these, 67 anomalies have been discovered, with rate in individual cases of up to 200 roentgen per hour. This is a very high rate. After all, people working with radionuclides may receive no more than five roentgens per year.

Four hundred children's preschool institutions were studied. At 139 of them, 732 sources of radiation with rate of from 50 to 25,000 microroentgens per hour were found—also a rather high dose.

According to my computations, in a year we should have around 3,000 curies. Yet due to the absence of burial sites, already now we have accumulated over 200,000 curies of radioactive waste.

Correspondent: At what stage is work on their burial?

Slavgorodskiy: Today we are only at the stage of collecting data. Everything comes down to the lack of funds. Out of the 180,000 rubles (R) which we needed in 1991, we were allocated R50,000. This was enough to develop the form of the cadaster [survey]—a document which must be filled out in order to obtain an overall picture of the radioactive waste. Fulfilling the cadaster today costs R740,000. Yet alas, not a kopek was allocated, although there is shouting about the burial sites in the millions...

Correspondent: What was the situation with burial sites earlier, before the disintegration of the USSR?

Slavgorodskiy: I do not remember than anything was ever brought in and buried here. But we took the waste out to Chelyabinsk, Krasnoyarsk, and Zagorsk. In Kazakhstan there were no burial sites which would have met the requirements and standards of MAGATE [International Agency on Atomic Energy].

Correspondent: And what about the burial site of the Nuclear Physics Institute near Alma-Ata?

Slavgorodskiy: It had the status of republic subordination and was built in violation of one of the two main safety conditions—hydroimpermeability.

The burial site is located in water-bearing strata. If a leak should occur, there are no guarantees that the radionuclides will not get into the water. For the present day we have no data on leaks as yet.

Correspondent: Why?

Slavgorodskiy: Because no studies have been conducted. All this once again comes down to money. I had insisted and still insist that engineering-geological surveys must be performed wherever there is this type of management. But that is very expensive, because drilling is required. The least expensive—hydrological—would cost R500 per meter. It would be necessary to drill about 30 wells, each up to 80 meters in depth.

They were planning to build a second line in the region of the institute, but permission for this was denied. Today the burial site is not yet full. In the future, evidently, it will have to be liquidated. It cannot be left in this condition.

Correspondent: There were rumors circulating about proposals from the American side to bury radioactive waste on the territory of Kazakhstan...

Slavgorodskiy: According to my information, certain foreign joint-stock companies offered to create a commercial enterprise for burial of such waste in the republic. Kazakhstan would rid itself of filth, they said, and at the same time there would be an influx of currency (up to a million dollars for one tonne). Such proposals came both to our ministry and to the government. Our response was totally synonymous. The question is so serious from the standpoint of safety, and particularly nuclear safety, that this work should not be built on a commercial basis. The

slightest oversight of safety technology in the race for profits would lead to dangerous consequences.

Our trouble lies in the fact that the study of the radiation situation here is in a sad state. Radiophobia has led to the fact that no oblast wants to have a burial site located on its territory. Yet if it is built in accordance with the MAGATE technical requirements, it will not pose any danger to the population or the environment.

Both for radioecology and for propaganda of radiological knowledge we need money. But... In 1991, for questions of radioecology of an environmental protection direction (without science!), only R180,000 were allocated instead of the necessary R4.5 million, and in 1992—R1.3 million out of R7.5 million. If the financing continues at this rate, we do not foresee an improvement in the radiation situation in Kazakhstan.

Scientist Reports Chernobyl Sarcophagus 'Cracks'

LD1709162392 Moscow ITAR-TASS World Service in Russian 1345 GMT 17 Sep 92

[By ITAR-TASS correspondent Nikolay Krupenik]

[Text] St. Petersburg, 17 Sep—The sarcophagus of the fourth block of the Chernobyl nuclear electric power station has become unsealed in places. Academician Spartak Belyayev reported this at an international conference "Nuclear Technologies in Tomorrow's World," which is being held in St. Petersburg. The scientist from the Russian scientific center, the Kurchatov Institute, noted that although 6 years ago the builders promised that the covering would be reliable until the end of the century, the "concrete body" has already yielded cracks: atmospheric deposits are periodically penetrating the cracks.

To confirm this the leading expert on the consequences of the nuclear catastrophe presented his colleagues with data on observations, calculations, and unique television and photographic film taken in recent years by expeditions of scientists from Moscow, St. Petersburg, and Kiev. Thanks to original technical judgments, the teams of scientists were able to "peep" through the mass of concrete and metal into the old reactor building.

According to Academician Belyayev, the total area of cracks and fissures in the artificial covering of the power set remains has reached 1,000 square meters. The second thing that worries experts now, said the scientist, is the old and explosion-damaged elements of the building structures. "One cannot guarantee that they will hold up for a long time. They may fall down." Academician Belyayev cautioned that releases of radioactive dust through the unsealed covering are to be expected as a result. "Nevertheless, every measure is being taken to somehow secure the dust, especially on the top floors, and special watering of the wreckage is carried out periodically."

The established realities, noted the Moscow scientist, make one think as to what should be done next. As calculations show, over 90 percent of the reaction fuel has remained inside the wrecked building. The academician reminded that in the summer the Ukrainian Government announced an international competition for the best project to make the Chernobyl facility ecologically safe, and expressed a personal opinion: Before implementing any constructive ideas, first a hermetically sealed "lid" is needed, inside of which a technological platform with robot-transporters could be placed. After that the dismantling of the obstructions should be gradually started, separating the highly radiation-polluted materials from the other elements, packing them into special containers, and burying them right there. Today this is the optimal way, concluded the expert of the Kurchatov Institute, Russian scientific center.

Chernobyl Staff Sees Undue Haste in AES Phaseout

92WN0737A Kiev PRAVDA UKRAINY in Russian 14 Aug 92 pp 1-2

[V. Vasilchenko, acting director of the Chernobyl Nuclear Power Station Production Association, interviewed by Valentin Vernodubenko and Viktor Rassokha: "Chernobyl Nuclear Power Station To Be Closed Within—"]

[Excerpt] **Since the accident at the Chernobyl Nuclear Power Station in 1986, it is impossible to count the rallies that have been held in Ukrainian towns and villages demanding that the Chernobyl station be closed immediately. And how many stormy debates on this subject have been held in the Ukrainian parliament! The press has also made its contribution, publishing articles demanding that the station's reactors be "pacified." Carrying out the parliament's will, the Ukrainian government adopted a resolution on July 1 of this year that envisions measures to ensure that the Chernobyl Nuclear Power Station will be taken out of service. All the nuclear power plant's power-generating units are to be fully shut down next year.**

"How is the government's resolution being implemented?" we asked V. Vasilchenko, chief engineer and acting general director of the Chernobyl Nuclear Power Station Production Association.

"There have been two government decisions on taking the Chernobyl Nuclear Power Station out of service," Viktor Nikolayevich answered. "One was quickly rescinded, since it failed to take into account a number of issues, above all financing. And on July 1, a resolution was adopted on measures to take the station out of service."

Correspondents: Will the reactors continue to operate in 1992?

Vasilchenko: The second generating unit was shut down in 1991. The first and third are being serviced, and they will start producing power again this fall. This is necessary in order to avoid disruptions that could cause an accident situation. Normative and technical documentation now in effect sets aside 5 years for preparing the station for shut-down. We have been given just 2 years to do this job, which is unlike anything in the world. This is why the resolution of the Cabinet of Ministers we are talking about has perplexed many nuclear station specialists. They can't understand how they can do in 2 years what the regulations say has to be done in 5. We constantly hear people say, "Why such haste?"

Correspondents: So the station's staff opposes the goverment's decision. Have we understood you correctly, Viktor Nikolayevich?

Vasilchenko: Let me put it this way: The Chernobyl station specialists do not agree with the planned timetable for taking the station out of service in all respects, but they will do everything in their power to carry out the decision. A program has been drawn up to this end, and it is already being implemented.

Correspondents: What is the staff currently doing?

Vasilchenko: After the incident at the Leningrad Nuclear Power Station, which uses RBMK-type reactors like those at the Chernobyl station, it was decided to replace the shut-off and regulating values at our station. It was defects in those valves that caused the accident at the Leningrad station. We plan to complete all the work on the first and third generating units by September or October, and then to start up both reactors. This will not be easy. The equipment I'm talking about is made in Russia. It was difficult to reach agreement on partial deliveries of this equipment.

We're going to make the parts we lack in Kiev. We need more than 1,500 such valves for each reactor. Without this it will be impossible to start up the two generating units in the fall.

Correspondents: How long will the reactors continue to operate? And another question: The press has reported rumors to the effect that highly advanced equipment has been delivered to the plant. What is being talked about here?

Vasilchenko: We will start up the two reactors on a temporary basis, which is not at variance with the resolutions of either the Supreme Soviet or the Cabinet of Ministers. As I already said, unless they are started up, it will be impossible to ensure the station's normal operation over the winter. And in 1993 we will shut them down. The job of supplying heat to the station, as well as to the "sarcophagus," will be taken on by a new boiler facility whose construction has gotten under way. The press reports apparently have to do with that facility, as well as with the new valves.

Correspondents: But there are fears that the startup of the third generating unit, which is next to the "sarcophagus," could trigger all but a spontaneous chain reaction in the destroyed fourth reactor.

Vasilchenko: Many specialists who have studied this problem agree that nothing of the sort is going to happen. An accident could occur only in the event of some sort of serious natural cataclysm. But, excuse me, for all practical purposes there isn't a single nuclear power plant in the world that is immune to such natural disasters. But since this problem worries the Ukrainian public, we are studying the effect of the operating third generating unit on the "sarcophagus." And believe me, if we find even one fact confirming that such a threat is real, the third generating unit will not be started up. And let me return to the government resolution. It is important to us that it provide for the creation of a specialized construction and installation directorate that will be in charge of taking the equipment out of service, and that it clarify financing issues. And we regard the outlined measures with regard to social protection for the Chernobyl station's employees as insufficient. They are not of a long-term character and [do not] ensure that Ukraine will retain first-rate specialists in the field of nuclear engineering.

Correspondents: And here it seems we have come to the main issue. Does it grieve you that the Chernobyl Nuclear Power Station will no longer be on Ukraine's nuclear power map?

Vasilchenko: It can't help but grieve me. I started here as an auxiliary equipment mechanic and technician, and went on to serve as senior engineer in the turbine department, shift manager, and shop head. Now I'm chief engineer. I know many of the station's 4,500 employees personally. I know for certain that most of them did not come here to earn big money. By way of comparison, let me say that on average, the station's specialists probably earn no more than a streetcar or bus driver. I won't even compare their salaries to what miners make. We professional nuclear station employees were initially attracted by the prestige of this industry and the outlook for it. We made it through the accident and have spent our professional careers here, and this is what keeps us at the power station...

Aerial Survey Reveals Bishkek Radiation 'Anomalies'

93WN0009B Alma-Ata AZIYA (MEZHDUNARODNAYA GAZETA) in Russian No 16, Jul 92 p 6

[Article by Aleksey Yermolov: "Environmental Report: Radiation Under the Porch"]

[Text] Republic of Kyrgyzstan—Three days ago, a helicopter with geophysicists aboard patroled over Bishkek. The Gera (meaning "geophysics of radioactive anomalies") small enterprise was carrying out a government assignment to make a gamma-spectral survey of Kyrgyzstan's capital.

For journalists, this subject was completely off limits only recently. And it is extremely interesting: What kind of radiation could be present in placid Bishkek, far away from Chernobyl? Here is what the author saw.

In the Air.

Inside, the typical eight-seat Mi-8 proved jammed with instruments, sensors, and recording machines—a veritable flying laboratory. The person in charge of the flight, geophysicist Vitaliy Lebedev, monitored the readings of the recording instruments as they registered radiation in the uranium, thorium, cesium, and other spectrums. His assistant, geodesist Viktor Trupp, was responsible for matching the readings to their sites and taking aerial pictures of the route.

After calibrating the instruments in a control area, our helicopter headed for Bishkek. Soon we were over the city's northern outskirts; the spools of ribbon were turning, and the recording instrument needles traced out meandering lines on the rolls of paper. Natural radiation background radiation isn't constant; it varies within certain limits.

It took the helicopter seven minutes to traverse the city from north to south. We could see the television tower, the

railroad station, the various neighborhoods. Then we turned 100 meters to the east and began a new run, this time from south to north. And so it went, time after time, as we cruised through Bishkek's airspace at an altitude of 70 meters.

The needles of the six recording instruments tracked the background radiation curve. Natural background in the thorium and uranium spectrums vary only negligibly. A slight increase in background radiation was recorded in the vicinity of Lenin Square, as a result of the presence of a large quantity of granite slabs and supports there. However, contrary to expectations, the "White House," whose facing also consists of a fair amount of granite slabs, showed no deviations from the norm. On the other hand, the special security service at the presidential palace did make its presence known. On a second pass, the helicopter received a radio inquiry: Who are you, and why are you flying over us? Helicopter pilot Anatoliy Paliy gave an explanation, and we were left alone.

Natural background radiation began showing a slight increase in the southern outskirts of the city, in the vicinity of a gravel quarry. But all within the allowable limits. Suddenly the needle of the cesium spectrum sharply swung to the left and registered a sharp peak on the ribbon. An anomaly! Commander Lebedev gave an order, and our helicopter executed a turn and began hovering above the dangerous area. The operator changed the sensitivity of the sensors, and the helicopter began making short runs back and forth. Soon the radiation source was securely fixed to its site.

Under us were the buildings of a cancer center. It is clear that powerful sources of gamma radiation, such as X-ray machines and radioisotope devices, had been activated there. But the unusual thing was that all those instruments should give off radiation only when turned on. But we were recording persistent background radiation.

And so we registered the site. Tomorrow a ground group would go to the site with instruments, and the source of the high radiation would be identified. Running ahead, let me say that in this case the source was a storage facility for radioactive isotopes at the cancer center.

Every day in the air brought a radioactive find, and more than one. A few days ago, two powerful anomalies were registered in the center of the city. One peak was recorded in the vicinity of the Central Telephone Exchange, and the other strong peak occurred in the area of a private construction project on Pobeda Street.

The day before yesterday, an anomalous radiation peak was identified at the city's holy of holies—the main water collecting faciity at Orto-Alysh. Geologists who went out to the site discovered an outcrop of red uranium-containing ore.

On the Land.

At the same time, another group of "Gera" specialists, armed with sensitive radiation meters, was combing the anomalies detected earlier. It found the first radiation source inside a construction site that was enclosed within a concrete wall, behind the Central Telephone Exchange. And although the power of the anomaly was such that the geophysicists' radiation meters to give off-the-scale readings, the considerable distance from residential buildings and the heavy barrier apparently shielded the city center's residents from radiation.

The geophysicists did not try to identify exactly what was causing radiation on the ground—this was not within their competence. Under existing regulations, on finding an anomaly and establishing its location, the geophysicists notify the appropriate services. We saw how they operate on Pobeda Street.

The radiation source there was found directly under the porch of a residential building. It was removed by soldiers from a special civil defense detachment that was directed and assisted by officials of the republic sanitation and epidemiological center's radiological laboratory and officers from the city's civil defense service.

The source proved to be quite a powerful one—more than 20 roentgens per hour. How did the radiation source wind up under the building's porch? With the sand. The owner said that he had trucked in sand from the Chu River. He had filled in the yard and placed concrete slabs over it. And so the soldiers had to literally sift all the sand bucket by bucket until an ampulla that caused the instruments to give off-the-scale readings was unearthed.

Because so many years had gone by, the number on the metallic capsule, which was about the size of the bone in a man's little finger, was unlikely to be of help in finding the owners who negligently lost the lethal ampulla or got rid of it in a criminal manner. The owner of the house and his wife were retirees. He had already had two heart attacks, and his wife was sick too. Both were sent to a medical commission for a detailed examination to assess the effects of their many years of irradiation. The radiation had lurked under the porch for almost 20 years.

The source in an out-of-the-way area near the Central Telephone Exchange was extracted by Lieutenant Colonel Samarbek Baygaliyev, chief of the city civil defense center, and radiologists Klara Mamushkin and Antonina Zhugan. On arriving at the site, Baygaliyev turned on his army dosimeter, and the portable radiation meter that Zhugan was carrying began clicking. They went up to the site where the geophysicists had found the anomaly and had marked it with stones. The reading on Baygaliyev's instrument immediately went off the scale, and he switched it to a higher range. Finally the clicks of the sound sensor sharply increased in frequency and merged into a single unbrocken beep.

The instruments were registering 2.8 roentgens per hour. We were standing on the edge of a foundation ditch. Somewhere here, in a pile of scrap building materials, lay the radioactive "mine."

"Well, that's enough, let's get out of here," Mamushkina ordered.

Indeed, who knows, even the film in the camera could be exposed. We moved back about 40 meters. Here the radiation was only about 10 times above the norm. Leaving the correspondent behind to observe from afar,

Mamushkina, Zhugan, Baygaliyev, and several other assistants, after fastening orange "beetles"—dose accumulators—around their waists, went down to the center of the anomaly.

The fellows used shovels to pick up the soil, then carried it to almost the edge of the site and dumped it at the feet of Baygaliyev, who measured the soil's background radiation. Mamushkina and Zhugan monitored background radiation at the excavation site.

The fellows were already perspiring on their foreheads, and not because of the hard work, needless to say. The miner's hack had to be put aside—there was a danger that it might break open an ampulla; for the source was clearly an old one. And if the radioactive substance were to be released, it would be much more difficult to carry out decontamination.

But today they are lucky. After just a few minutes, Baygaliyev's dosimeter registered a sharp increase in radiation, meaning that the source was there, in the last load of soil. They had found what they were looking for. They put the source—a capsule about the size of a small-caliber bullet—into a lead container, after first writing down the number on the ampulla—925.

Another radioactive mine had been disarmed. But don't we have too many lost sources lying around? Last year an ampulla was found in Priissykkulye, on the Rybachye-Kochkorka highway. Two lost sources were found in Karabalta, and now two more in Bishkek. And surveying of the eastern, more industrialized, part of the city is still ahead.

There are numbers on all these ownerless sources of radiation. One would think that it would not be difficult to use the numbers to identify the producer plants, and after that the person who lost or simply got rid of the dangerous ampulla. But until recently those responsible slept easy. Nobody was looking for them, nobody was trying to punish them.

It seems as if the good times are over. The republic has decided to throughly clean up its territory. After Bishkek, the Chuy Valley will be surveyed, followed by the Issyk-Kul resort area.

Ignalina Nuclear Power Station Shutdown

Power System Coping With Shutdown

LD0709170592 Vilnius Radio Vilnius Network in Lithuanian 1400 GMT 7 Sep 92

[Text] The Ignalina AES [nuclear electric power station] has been out of operation since 5 September. According to a report by the BALTIC NEWS SERVICE, Lithuania has been buying almost half its necessary power from Belarus and Estonia since that date. Lithuania had been selling 5 million kW hours of energy daily.

According to power engineering officials, unexpected breakdowns like this one do not cause any danger or breakdowns of any kind because Lithuania is part of the unified northwest power engineering system.

When the Ignalina AES went out of operation, the Elektrenai thermal power station started working at a greater capacity. At the moment, four of the eight power units are operating at full capacity. Only one power unit has been operating at minimal capacity of late due to the short supply of natural gas. The Elektrenai thermal power station is now using fuel oil reserved for the winter.

Ignalina Power Station Unit Restarting

LD0709171392 Helsinki Suomen Yleisradio Network in Finnish 1600 GMT 7 Sep 92

[Excerpt] The pipe fault in the second unit of the Ignalina nuclear power station in Lithuania has been repaired and the process of restarting the unit has begun. The unit was shut down on 5 September when a small pipe broke. The reactor had to be shut down because the pipe could not be repaired otherwise, the Lithuanian Energy Ministry said. According to the Ministry, there was no leak of radioactive substances from the power station.

The Finnish Center for Radiation and Nuclear Safety confirms that the pipe breakage in Ignalina was not detected in Finland in any way. [passage omitted]

Radiation Spots Detected in Kursk Oblast

LD0909103892 Moscow Russian Television Network in Russian 1600 GMT 8 Sep 92

[From the "Vesti" newscast]

[Text] Two radiation spots have been discovered on an area of 1.5 hectares in Kursk oblast. Experts think they are a result of Chernobyl. The level of radiation there exceeds the permitted maximum, but in spite of this people are still living in the settlement of Ponyri—for which they are being paid generous compensation: 30 rubles a month, or one ruble per day.

Scientists Disclose 'Nuclear Cloud' After First A-Bomb

LD1409190592 Moscow Russian Television Network in Russian 1000 GMT 14 Sep 92

[From the "Vesti" newscast]

[Text] Following the explosions at Semipalatinsk test site, a nuclear cloud penetrated into Kuzbass, according to Kazakh scientists who are members of the international antinuclear movement Nevada-Semipalatinsk. After the explosion of the first atom bomb, the dose affecting the Siberian region exceeded seven rem, which is far above the level permissible for human beings.

Presidential Decree on Operating Authority for Nuclear Power Stations

925D0720A Moscow ROSSIYSKAYA GAZETA in Russian 17 Sep 92 p 6

[Decree No. 1055 on the Organization for the Exploitation of Nuclear Power Plants in the Russian Federation, signed by B. Yeltsin, Russian Federation president, 7 September 1992]

[Text] Taking into consideration the need for centralized state control of nuclear power stations and securing their safety in accordance with MAGATE [International Atomic Power Agency], I hereby decree:

1. It is established that the Russian state concern for electric and thermal energy at nuclear power plants (the

Rosenergoatom Concern) is a state enterprise which, on its own and with the participation of other enterprises (organizations) performs the required functions during all stages of the operational cycle of nuclear power plants in terms of the choice of sites, design, construction, commissioning, exploitation, termination of exploitation, and other functions of the exploiting organization.

2. It is established that the property of nuclear power plants—existing, under construction, planned, or mothballed (nuclear systems, fissionable substances, equipment, buildings, and installations which are part of the nuclear-power cycle)—and any other property used for the direct purpose of ensuring the functioning of nuclear power plants is federal property.

Within a period of one month the Russian government must ratify the list of said sites and properties used in the nuclear power industry.

3. In coordination with the Russian Federation Ministry of Atomic Energy, the Russian Federation State Committee for the Administration of Government Property, assign by contract to the Rosenergoatom Concern the right to full economic management of the following:

The federal property of nuclear power plants: existing, under construction, planned, or mothballed (nuclear systems, fissionable substances, equipment, buildings, and installations included in the nuclear-power cycle);

The federal property of state enterprises and organizations (as per the appendix) directly used in ensuring the functioning of nuclear power plants.

4. The local administrative authorities shall assign to the Rosenergoatom Concern land sectors within the boundaries of the safety protection zones of nuclear power plants with the right to open-end utilization.

5. It is established that the Rosenergoatom Concern is authorized to transfer on a contractual basis the federal property assigned to it along with the right to operative management of said nuclear power plants, enterprises, and organizations.

6. In signing the contract which assigns to the Rosenergoatom Concern the federal property, the Russian Federation State Committee for the Administration of State Property, coordinated with the Russian Federation Ministry for Nuclear Energy, will secure conditions for ensuring safety throughout all the stages of the active cycle of the nuclear power plants.

7. It is established that:

The Russian Federation State Committee for the Administration of State Property, coordinated with the Russian Federation Ministry for Nuclear Energy, will approve the statute of the Rosenergoatom Concern and the statutes of the nuclear power plants, enterprises, and organizations listed in item 3 of the present decree;

On the instruction of the Russian Federation State Committee for the Administration of State Property, the Russian Federation Ministry for Nuclear Energy will conclude a contract with the head of the Rosenergoatom Concern and, on the presentation of the head of the concern, with the managers of nuclear power plants, enterprises, and organizations listed in item 3 of the present decree.

Mikhaylov Lauds Achievements of Atomic Energy Ministry

MK2908144092 Moscow MOSKOVSKIYE NOVOSTI in Russian No 35, 30 Aug 92 (signed to press 25 Aug) pp 14, 15

[Interview with Russia's Atomic Energy Minister Viktor Mikhaylov by Vladimir Orlov; date, place not given: "I Am Considered a 'Hawk'... Conversation With 'The Man From the Military-Industrial Complex'"]

[Text] What is the military-industrial complex? Everyone acknowledges that it is undoubtedly a powerful force today, capable of affecting Russia's entire political climate. But beyond that, as a rule, there are abstract arguments.

It is not surprising that the military-industrial complex leaders themselves prefer not to acknowledge that this abbreviation bears no direct relation to them. Some say that they are just the industrial complex and others that they are just the military complex...

My interlocutor is a military-industrial complex man through and through. Minister Viktor Mikhaylov has concentrated the control of all the country's nuclear power potential in his hands. A theoretical physicist, one of the creators of nuclear weapons, and a guardian of their secrets, he has headed since March 1992 a key, elite industrial sector. Almost 2 million employees of the Atomic Energy Ministry concentrate uranium, construct AES's [nuclear electric power stations], produce filling for mass destruction weapons, prepare nuclear explosions...

"I Am That Very Same Military-Industrial Complex!"

Viktor Nikitovich, whom I have heard described as one of the "unsinkable aircraft carriers of the past," greets me with a cigarette in his mouth. He looks intently: "Yes, I am that very same military-industrial complex!"

MOSKOVSKIYE NOVOSTI: The very same one from which, according to the widely used expression, a threat to the present authority emanates? Are you a threat?

Mikhaylov: I am a support for authority. And what is more, I say to you that the revival of industry, and that also means the restoration of Russia's greatness, will proceed from my ministry.

What have we come to: The military-industrial complex has virtually become a dirty word. People are afraid to acknowledge that they work here. The attempt to destroy the military-industrial complex is on Gorbachev's conscience. He virtually called for our plants' directors to be crushed. Talented scientists and organizers—just like bugs!.. He should have crushed the party functionaries—most of them were rogues and incompetents. But the party elite simply did not worm its way into our sector or take root—it was afraid.

MOSKOVSKIYE NOVOSTI: Was it afraid of your power?

Mikhaylov: Of its own incompetence. They found the word "atom" frightening.

MOSKOVSKIYE NOVOSTI: But even today, to most people what your sector does is a closely guarded secret.

Mikhaylov: In actual fact only 15 percent in the Atomic Energy Ministry work on "defense": This is the whole nuclear weapons complex, which I, incidentally, was in charge of in recent years.

MOSKOVSKIYE NOVOSTI: And the remainder?

Mikhaylov: Sixteen percent of the ministry's capacity work on science and advanced technologies. We have 7,000 doctors of science alone.

Showpiece Ministry

Mikhaylov: Or take construction. We have constructed such cities as Navoi, Protivno, and Podolsk. We produce one in 15 bricks in Russia, but ours are twice as cheap. And what finishing materials we have! What are you talking about? Well then ... And our plots of land in the Urals, in Siberia? And the cycling track in Krylatskyy? And the quality video recorders and compact discs? All this is our doing.

The Atomic Energy Ministry extracts the purest gold in the world. We have the cheapest zirconium production, the best isotope separation technology, and our energy consumption is 20 times lower than in the United States...

MOSKOVSKIYE NOVOSTI: A real picture of paradise. And your workers have probably gotten used to their specially privileged living conditions?

Mikhaylov: Who told you that? I have been in the sector since 1957 and have not seen any privileges. The virtue is that we develop comprehensively: Attached to every uranium combine is a state farm with a harvest yield, as a rule, about 150 percent higher than the average.

MOSKOVSKIYE NOVOSTI: And the medical aspect?

Mikhaylov: The cancer rate in the sector is half that of the country as a whole. Life expectancy is seven years higher. Last year we allowed a group of clergymen headed by a patriarch to visit the desert where St. Serafim Sarovskiy spent five years in solitude; Arzamas-16 is now there. They were staggered by our city: the cleanliness, the order, people's civilized nature.

And Yeltsin, when he came to Arzamas-16, was struck by the fact that we had managed to preserve the entire forest tract.

"Two to Three Nuclear Explosions a Year Are Needed"

MOSKOVSKIYE NOVOSTI: A strange combination, you will agree... Such care about ecology—and the continuation of nuclear tests in Novaya Zemlya, which are provoking a resolute protest from ecologists.

Mikhaylov: I told Yeltsin the same as I am telling you now: If we want to remain a nuclear power, tests are necessary. Two to three a year; that is enough.

Where can they be held? In Novaya Zemlya, of course. There is no other place. Not a single person in the world will understand if we start to construct another test site. Novaya Zemlya is the optimum place, if safety measures are to be observed during the tests. I am a scientist who knows these things. And I cannot do without tests. Nobody can. The scrapping of tests is being called for by those who know nothing about the construction of a nuclear bomb.

MOSKOVSKIYE NOVOSTI: Of course, you are an expert on nuclear energy. It is clear that you stand up for its advantages. But can it be that you never fear for the possible tragic consequences?

Mikhaylov: You have to choose the lesser of two evils. Today, surplus radiation ranks between 10th and 15th among the influences which lower the life expectancy of Russians. The activity of the oil and gas complex, for instance, is far more dangerous for your health.

Over the last 20 years, I have spent two or three months a year in Novaya Zemlya. Everything's fine: Today, the effect of radiation is actually being brought down to a minimum. Although many people want to make political capital from discussions on the threat of radiation. Because people abroad are watching very closely: On the one hand they are afraid of catastrophes, and on the other they know that this complex is our strength, and they are trying to shatter and destroy it.

Private Business Is Paying for Projects

Mikhaylov: Take Chernobyl, even... Of course, it was a catastrophe. But I see something else here too. Hundreds of thousands of people were resettled thoughtlessly, and they suffered colossal psychological damage, which will send a person to his grave far quicker than the dose of radiation received there. International organizations have already begun to smirk at our incompetence.

MOSKOVSKIYE NOVOSTI: But it is without any kind of smirk that the international organizations are keeping an eye on the appearance in Russia of private companies which are starting to finance the not always incontrovertible plans of your ministry. I'm thinking in particular of the firm Chetek, which you actively supported.

Mikhaylov: The issue concerns the project for destroying chemical weapons in large quantities. In my opinion, a quite reasonable and attractive piece of technology was proposed: by means of a subterranean nuclear explosion, the weapons are broken up and fused into the mass of soil. In this way, tens of thousands of tonnes of arms can be buried for many years with one explosion.

This idea has its supporters and its opponents. So it is vital not to stop here, but to carry out experiments. The whole project costs 100 million rubles [R]. Chetek gave 10 million, expecting to cover the expenditure in the event of commercial application.

We didn't have any money, so we turned to private capital! But now Chekek has financial difficulties, and it is withdrawing further and further away from this problem. We did not even need to renew the contract with them, the state found the money...

MOSKOVSKIYE NOVOSTI: In Chetek's case, discussions about a "commercial application" prompted many questions, but in the case of exporting uranium everything, in my view, is clear. Russia wants to and can become a leader, but the uranium market has already been divided up without us, and the United States is tripping us up...

"Nothing Will Stop Us Exporting Uranium"

Mikhaylov: The Americans assure us faithfully that they will help to set up a market economy. But in fact they are conducting a savage trade war against Russia. They accused us of setting dumping prices for uranium. I gave my answer to representatives of the U.S. administration: Stop talking rot! Our prices are low not because we are dumping our product, but because we have the very best technologies in the world.

Nothing will stop us from selling uranium abroad. It will be difficult for us. But we have sufficient forces. Already, the French company Cogema as well as Italian and American firms are straining at the leash to cooperate with us in the sale of uranium.

Serious people in the West know that the Russian Atomic Energy Ministry has to be reckoned with. We have moved five or 10 years ahead of the West in a number of modern technologies. That is why the Japanese, South Koreans, Chinese, and Australians are requesting to go into partnership with us... I have only just signed a contract in the Republic of South Africa to sell this country technology for extracting gold from open cast mines.

I have every reason to look at this sector's future with confidence and optimism. It is possible that the revival of all Russian industry is on the horizon. The Americans can feel this, and it does not suit them: We are only necessary to them as an additional source of raw materials.

MOSKOVSKIYE NOVOSTI: You risk violating an unwritten rule: You know, now everybody is looking to the future pessimistically. What's more, it has virtually become the fashion to curse the government.

Mikhaylov: I am sometimes called the "hawk from the military industrial complex." Judge for yourselves what kind of "hawk" I can be if, on the whole, I sympathize with the steps being taken by the reformers from the government. They are called "a team of theoreticians." But you know, this is by no means the worst thing that you could have.

Moreover, there is another aspect. Right now, our attitude to the development of science is disgraceful.

If this continues, I will forget about my optimism, and in five years time we will turn into a regular workshop which Western business will not even want to come near. The West will merely pump our brains and resources. And then there will be no "elite" Atomic Energy Ministry to come to the rescue.

Yablokov Sees Ongoing Hazards in Nuclear Industry

92WN0726A St. Petersburg NEVSKOYE VREMYA in Russian 29 Jul 92 p 1

[Article by Russian Presidential Adviser for Ecology Aleksey Yablokov: "First-hand From Russian Presidential Adviser for Ecology Aleksey Yablokov: Our Reactors Are 100 Times More Dangerous"]

[Text] Academician A.P. Aleksandrov once said that our nuclear reactors are so safe that they could even be placed on Red Square. He later admitted his mistake. For our reactors are 100 to 200 times more dangerous than Western ones. But that's only part of the truth. Most accidents occur on account of mistakes by personnel. For example, that is the cause of three-fourths of all accidents on nuclear powered submarines.

Despite the demands of the times, pathological secrecy reigns in our nuclear agency. The official announcement of the fire at the second generating unit at the Chernobyl Nuclear Power Plant said that nothing special had happened. In reality, the roof of the machinery room had collapsed. After the March 24 incident, the managment of the Leningrad Nuclear Power Plant also assured everyone that there was no danger to people. But it was later learned that background radiation in the vicinity of the station had been found to have risen to up to 300 microroentgens per hour.

Our nuclear power stations are extremely dangerous installations even in a "calm" state. Eight years ago, studies showed that in the outwardly fine water reservoirs at the Leningrad and Ignalino nuclear power plants, fish were noticeably different from ordinary ones in terms of a number of important indices. There are sizable concentrations of tritium in ground waters for many kilometers around the Yuzhnoukrainskaya Nuclear Power Plant. Significant radioactive contamination has been found in the five square kilometers surrounding the Beloyarskaya Nuclear Power Plant.

The problem of burying radioactive wastes has yet to be solved throughout the world. No one knows what to do with them, and we will be forced to set aside enormous areas of land for nuclear burial sites. The problem of mothballing nuclear power stations that have reached the end of their service lives remains acute. And it is already necessary to shut down four generating units in Russia—at the Novovoronezhskaya and Beloyarskaya plants.

The financial aspect of the problem is no less important: The construction of a nuclear power plant consumes up to 20 percent of all the energy that it generates during its existence. There is every reason to believe that mothballing with require no less energy.

Needless to say, we cannot close down all nuclear stations today—they provide 13 percent of all our energy. However, it is essential to urgently redirect financial and material resources toward the development of other energy sources.

In the meantime, Germany and Japan have expressed a desire to help us improve our nuclear power stations. There is suspicion that these countries are merely looking for markets for their nuclear technologies. In any event, this dovetails quite well with the provisions of the recently adopted All-European Energy Charter, under which Russia is to continue to supply Europe with oil and gas for many years to come, while meeting its own needs through new nuclear generating units.

Bomb: Cheapest Way to Avoid War

927F0292A Moscow IZVESTIYA in Russian 19 Aug 92 pp 1, 3

[Interview with Yuriy Alekseyevich Trutnev, academician, in Arzamas-16 by Vladimir Gubarev; date not given: "Yu. Trutnev: 'A Bomb Is the Cheapest Way to Avoid a War'"]

[Text] **Vladimir Gubarev is a science journalist, author and playwright. The author of books on astronautics, nuclear physics, genetics, and the Chernobyl disaster. His plays "Sarcophagus," "Stalin's Vacation Home," and "Vilyard" are being performed in the theaters of many nations. He is now director of the "Nekos" Studio that brings together well known science journalists and Moscow University students.**

Each of us has been left a legacy by Andrey Dmitriyevich. To some he has left his understanding of the world and society, to others—conscientiousness, to yet others—the courage and ability to carry on the struggle, and to all of us—the very "Sakharov peace" that has become a thrilling page in the history not only of our Motherland, but in the life of 20th Century mankind.

In addition, Yuriy Alekseyevich Trutnev has inherited the responsibility for the fate of the nuclear and thermonuclear weapons developed under Andrey Dmitriyevich Sakharov's guidance. For we must not forget that he was not only a great humanitarian, but an equally great theoretical physicist. Not only were Sakharov and Trutnev colleagues, comrades-in-arms—they labored together for many years, and met for the last time just a few days prior to Sakharov's death—but more than that, they were like-minded. Of course they did not always agree, and they did have their differences, but in the end they always found a common viewpoint. Both in science and in politics. And for that reason, Yuriy Trutnev today not only holds the post at the Federal Nuclear Center of Russia once held by Sakharov, but also sits in the same chair to the left of Khariton, the permanent science director of the center, that formerly belonged to Sakharov.

It is not easy for Yuriy Alekseyevich, as his views on nuclear arms are unusual, and have been criticized both by some colleagues and by public representatives.

Gubarev: Do you still hold you exceptional viewpoint on nuclear disarmament?

Trutnev: Why "exceptional?" I merely think as a citizen and specialist. The fact is that we've already got used to hearing "They should just be exploded," we are accused of being afraid of losing our jobs, and so on. We will never lose our jobs, even if we are no longer involved with weapons. We specialize in such a broad field—we deal with a variety of areas of physics, with technologies, with structural designs—that we will always find an application for our skills. And in part, this is already happening because of the narrowing work front. It is important to understand that arms reduction is a completely natural process. So that talks about losing jobs and "explosion mania" are often not just incompetence, but an attempt to gain political capital.

You can curse nuclear weapons and those who have dealt with military business. But you must not forget that in our world, a complex world that is seized with crises, our nation still needs to defend itself. And from my standpoint, nuclear armament is the cheapest way to deter any threats, any dangers. Nuclear weapons are political weapons as well. They force a would-be aggressor to think twice before starting a conflict with a nation that has them. And for us they have a special meaning when you understand the geopolitical position of our nation. It is fine for the United States, sitting as they do on three oceans. But we are square in the middle of a continent. And who ever told you that things are all quiet here? Remember the boundaries, the territorial claims against each other, including against Russia. I'm not talking about any imperial ambitions. I'm just stating the reality.

Gubarev: Are you concerned about the current state of affairs?

Trutnev: Of course. The crisis is deep. It looks as if it could all fall apart... I am not saying that nuclear weapons will save Russia from disintegration; but having them will still make anyone think twice before getting pretentious about us... Of course, things have lightened up for the moment, but we must live beyond the moment. And who knows what lurks in the future? At least the Americans are not ready to lay down their nuclear weapons. Arms reduction is the issue, and I believe this is the right way.

Gubarev: Have you been the ones who carried out orders? Or have you determined the nuclear strategy of the nation?

Trutnev: Of course, we have not been the determining force. But our work has influenced the behavior of political activists. I am not trying to justify myself, and what is more, I am not at all sorry that I came here and took part in the development of nuclear weapons. We have worked to strengthen the ability of our nation to defend itself, and without sparing ourselves. Together with the entire nation, because nuclear armament is the labor of thousands. And our conscience is clean, as we had no Hiroshima and Nagasaki. And not once have there been accidents with nuclear weapons... Knock on wood!...

Gubarev: I'm with you in knocking on wood... I know that a group of specialists was recently invited to the United States, where they were shown the methods and means of dealing with such accidents; the Americans, so to speak, shared their own sad experience.

Trutnev: We are lucky to have had no such serious accidents... But what now? It seems to me that nuclear weapons will be around for a long time to come. They talk about "weapons of mass destruction," but look what happened at Dresden. How many were killed there by "carpet bombing?" About forty thousand... And this without any nuclear bomb. And what about Iraq? Of course, nuclear weapons have their own special properties, multiple-factor effects, but likewise today's kinds of weapons, I would say...

Gubarev: Are no great favor.

Trutnev: Exactly! So we have to think more broadly, not just about nuclear weapons, though they have to be reduced, of course. In my view, the future of nuclear weapons is first of all a reduction of the number of warheads, improvement of safety, especially in our nation, and the development of new, more reliable and safer types of weapons.

Gubarev: In such an event, are tests necessary?

Trutnev: Nuclear armament cannot exist without them. I sometimes hear "Couldn't a weapon be developed without testing it?" and the name of Andrey Dmitriyevich Sakharov is invoked. I talked with him about this just three days before he died, and he had not changed his viewpoint, though I tried to persuade him, recalling several instances

from our joint research. I have a lot of respect for Andrey Dmitriyevich, I am his pupil, but in this case he is wrong. If an engineering approach is taken to weapons, we must have tests...

Incidentally and most interestingly, this is beginning to be discussed by those who have stopped working on weapons or have nothing to do with their development... In fact, the issue of testing is strongly politicized. Yes, there have been atmospheric tests. That's one thing. Underground testing is an entirely different matter. Even in our memorable conversation, Andrey Dmitriyevich acknowledged that underground nuclear explosions are safe. I state this for those who are accustomed to invoking authorities.

Gubarev: But if there are guarantees of safety?

Trutnev: We have technology that ensures absolutely no emissions. For some reason it has been classified until now, although I believe that all these data should be made public for those carrying on this big discussion about tests. What have we to hide?!

Gubarev: And so, without nuclear weapons, our situation will no longer have to survive. What will it be like?

Trutnev: It all depends on the weapons system. One doctrine states that we have no fixed enemy, i.e. we must defend ourselves on all sides.

Gubarev: Isn't that Charles de Gaulle's definition?

Trutnev: Could be. And so, the system... It seems to me that a professional army should deal with nuclear weapons. Our weapons require professionals: responsibility is needed in handling them. And a strategy of flexible restraint and flexible reaction has to be selected. These goals will be met by forces having nuclear weapons... Tactical and strategic weapons are now being discussed. But it is not a question of terminology. Unfortunately, our weapons have penetrated into forces of all kinds, i.e. they are here, there, and everywhere. This is intolerable! Nuclear forces should be under the authority of the president. Right now, as I understand it, tactical weapons for us today are strategic, especially since elimination of the standoff with the United States. You often hear "Who is getting ready to attack us now?" Following that kind of logic, neither army nor weapons are needed. The weaker we are, the more temptations others will have. That seems clear to me.

Gubarev: Yuriy Alekseyevich, there are rumors that Yeltsin's announcement of re-aiming our missiles away from U.S. cities was your idea. We know that his proposal has started up a lot of false rumors throughout the world, and some have even called it chancy.

Trutnev: I can only say that I, too, have heard the president's announcement, and that my understanding of it is different from yours. The point was to eliminate the anti-American direction, i.e. to remove the flight assignments from missiles aimed at the United States. But the press has turned it all topsy turvy, as if the missiles have been re-aimed away from cities at military targets. This is absurd, since firing at cities or military targets is the same thing; there would be radioactive contamination everywhere. But to eliminate the possibility of firing at all is something else entirely! I believe that this was a political step, an act of good will to demonstrate that we are not enemies. And honestly speaking, one might have expected a reciprocal response; but unfortunately, there was none, and U.S. missiles are aimed at us as before.

Gubarev: In our conversation, you have chanced to mention that "care must be taken to make nuclear weapons safe, especially by us." what specifically did you have in mind?

Trutnev: I was not thinking of nuclear armament per se, but of the situation that has evolved in Russia and the republics. The deterioration of discipline, the possibility of accidents in transportation, and so on. Perhaps even terrorism.

Gubarev: Because of the breakup in the nation, is there a danger, to put it mildly, of a careless attitude toward weapons?

Trutnev: No, that cannot be said. On the contrary, measures today for the prevention of such accidents are more stringent. Ambitious and fundamental work is being done by the military, and we are providing technical support.

Gubarev: You are now 64 years old. How long have you been working here?

Trutnev: For 41 years.

Gubarev: You came here as an ordinary engineer?

Trutnev: As a laboratory technician.

Gubarev: And 40 years later, what is your position?

Trutnev: First deputy science director...

Gubarev: Sometimes nuclear researchers are called "blind hawks." Is it offensive to read and hear this? After all, people do not always understand how difficult your work is.

Trutnev: Not offensive for ourselves; we've endured worse. But distressed for speculation about weapons, for the atmosphere in the nation and in science. Everyone is looking for the reasons that things have got so bad, for someone to blame. And this is an answer: the military industrial complex. They're the ones who hogged it all up... And from that comes malice, ill will, and even meanness. Isn't the cause confused with the consequence?

Gubarev: Do you believe that the advent of nuclear armament has led to a breakthrough in the natural sciences?

Trutnev: Certainly. We have had to deal with physical phenomena that would be impossible to reproduce under laboratory conditions. Tens and hundreds of millions of degrees, pressure of billions of atmospheres, densities of hundreds of thousands of grams per cubic centimeter, times of hundred millionths of a second. Of course, this has led to completely new areas of physics.

Gubarev: You are a pupil of Andrey Dmitriyevich. What kind of a man was he?

Trutnev: Not only of Andrey Dmitriyevich. But also of Zeldovich, Frank-Kamenetskiy and Khariton. I have had to study with many.

Gubarev: Which of them had the greatest influence on you?

Trutnev: On the earliest stage, when I had just arrived here, it was David Albertovich Frank-Kamenetskiy. He was an

exceptionally well educated man, an intellectual. He helped me a great deal... At that time, we had small crowded rooms, and he sat opposite from me. And he simply began imperceptibly teaching me how to work. At the same time, he brought in books having nothing directly to do with our work, he might read a poem by Gumilyov in the full swing of the working day... He was like a father to us, and I drew much from him in both the scientific and worldly sense...

Gubarev: Excuse me, but Gumilyov in those times?! You were living in a closed city; they must have had you bugged not only at work, but at home as well!

Trutnev: Bugged or not, I don't know. It did not reflect on us. Furthermore, political issues were discussed among us much more openly than in the "wide world." We were working on a problem of state importance, and therefore the attitude toward us was apparently somewhat different from the rest. Freedom of thought in physics is inevitably tied up with freedom of thought in everything, including politics. We were unafraid, not "guarded" in our thinking.

Gubarev: Nevertheless, you were in a special situation.

Trutnev: Probably just for that reason. And besides all else, there were a great many intelligent people here: scientists with world- renowned names, making the atmosphere both friendly and creative. It forced us to take initiative, to be inventive, each trying to come up with a fresh idea. People were valued primarily for ideas and their development.

Gubarev: Is the "brain drain" problem far-fetched?

Trutnev: Much will depend on how events start to develop. I personally think that our people will scarcely leave, although I can't rule that out. After all, many of those who worked in Arzamas-16 have now turned up "abroad," i.e. in the Ukraine and Kazakhstan... But that's not the main thing.

Gubarev: What then?

Trutnev: I'm concerned about something else. For decades, for almost a half century, a unique scientific and engineering team was set up and worked here, joining together professionals of the most diverse specialization. This is a specific feature of nuclear weaponry, whose development brought together theoretical physicists, experimental researchers, technologists, designers, chemists, and so forth. This conglomerate is a unique phenomenon. I'm afraid that this team will fall apart in the present situation. And that would be a loss not only for Russia, but for all world science. That's the main thing that disturbs me.

Gubarev: You have met with Americans. Do they feel the same?

Trutnev: Arzamas-16 is the largest world center of science; on that they fully concur, and have a high regard for our work.

Gubarev: Isn't it strange that you are being sent to the United States?! Can they trust you, now that there are more, not to run off?

Trutnev: They have always trusted us, otherwise there would be no point. It's just that times have changed, and the "higher-ups" understand that scientific contacts have to be developed, and there is no reason for us to run off... They have finally got that straight!

Gubarev: Let's back up a bit. You have talked about Frank-Kamenetskiy. Now it's Yakov Borisovich's turn.

Trutnev: Zeldovich was something else. Of course, he was an exceptional man and a physicist. He had the ability to make the most complicated phenomena simple and understandable, literally at his fingertips... He could assess the most complicated phenomenon on the simplest model... We treated him as an eminent scientist, but there was no kind of wall between us. At work, all were equals. And when you sense the good will of a superior, when you come to him with an idea or a question about life and you know that he is bound to help and support you, it creates a special atmosphere... Yakov Borisovich was a very astute man; he loved Saltykov-Shchedrin and often quoted him. Always appropriately and to the point.

Gubarev: Did he change when he left here?

Trutnev: No. He congratulated me very cordially when I reached my fiftieth birthday. He gave a willing hand when we turned to him for help. And for our part, we never forgot him. Do you remember that he had problems? Purely political... At that time, we wrote letters in his defense to "Kommunist," but they were never published.

Gubarev: And Sakharov?

Trutnev: At first the situation was like this: we didn't know what was going on in the next department, so in the early years we did not suspect what Sakharov was doing. And then, in about 1953, or even before that, we began to interact... We worked very closely, and felt the full measure of happiness of communicating with him. We had great confidence in one another. And we talked with him about everything: from nuclear weapons to political issues... What were his characteristics? He could see the essence of a question, and already had an answer. It was mind-boggling! He was inventive, and had an enormous number of ideas. Many found sub-units and are now living on those ideas, developing them... And the idea of the first hydrogen bomb, at that time a thermonuclear device, once again, he was one of those who came up with it... In many ways, he supported our undertakings. I had a friend, Yuriy Nikolayevich Babayev; we managed to get a slightly different view of what had already been done, and came up with a new design on which a number of articles were based, and Andrey Dmitriyevich gave us his support. Of course, we had no idea that he might leave Arzamas—what would we do without him?! But the time came when he very much wanted to leave...

Gubarev: One thing bothers me. Why was there no protest from the physicists in Arzamas-16 when Sakharov was sent to Gorkiy?

Trutnev: Indeed, there were no protests, even though everyone had a good idea that something was amiss. And for that reason, no letters were signed against Andrey Dmitriyevich, and moreover when he fell into disfavor in Moscow, we went to him, talked, reached some understanding... Why was there no protest? The answer is simple... No, it was not a question of civil cowardice. Nevertheless, we always lived under the threat of being answerable, we understood full well that the nuclear

defense of the nation was on our shoulders, regardless of what political storms were brewing in the "wide world." And incidentally, Sakharov also knew this full well.

Gubarev: He held no grudge?

Trutnev: He understood everything, and knew us well... No, you have asked a hard question, and I can honestly say that there is no answer.

Gubarev: And one thing more. The house that you live in is opposite from Sakharov's, only the street separates you. Along that street, NKVD agents with dogs marched columns of prisoners. Every morning out, and in the evening back again. Did this have an effect on you? In his memoirs, Sakharov merely mentions the fact that prisoners took part in building the "Project."

Trutnev: Once in the evening I left my friends and began to cross the street. I passed between the prisoners and a guard, and suddenly he turned on me, pointing his rifle, completely brutal... I remember those columns. The prisoners worked here until 1957. I understand Sakharov, he didn't want to talk and write about this in detail. It was a tragic part of our story, for all of us without exception. We have to know and understand, but we cannot condone... It is not something to talk about, but rather to think about...

Every one of us has to have a purely personal part that is our very own. As an example, when we celebrated Sakharov's seventieth birthday, I declined from giving a speech about my reminiscences because too many people today like to talk about their closeness to him...

Gubarev: And Khariton? You've been working with him for just about half a century. What would you say is typical of Yuliy Borisovich?

Trutnev: The ability to penetrate to the most subtle essence, and very often he has called attention to what others have not noticed. It might seem as if he has been occupied with trifles. And then it turns out that these "trifles" have grown into an enormous problem. His motto: "I have to know ten times more than I can do," which is a lot, and he is certainly right.

Gubarev: He has adhered to this all his life?

Trutnev: Of course. You know what he is doing: wile I'm sitting here talking with you, he is at work. This morning we arrived from Moscow, he dropped in at his house, held a scientific-engineering council at 10:00 AM, and right now, at 8:00 PM, he is very likely familiarizing himself with documents. At 10:00 PM, the light will still be burning in his window...

Gubarev: You were with him on the train? It left at 8:40 PM... What were you doing?

Trutnev: We went to the lounge car and started a "production" meeting. We were there until 11:00 PM. Then I said that it was time to break off and get some sleep. For some reason, that has come to be my job... "You do what you want," I say, "but I'm tired." He looked at me so reproachfully, but just the same, we quit for the night... And he's already 89 years old... And sometimes he has to be torn away from his work. And, you know, it's hard for him now, his sight is failing... The lady from the first division who is supposed to get the documents goes home and waits for Yuliy Borisovich to phone. He sends a car for her, she arrives, he turns over the documents, and then takes her home... And it's been that way for years. This is a man with an amazing capacity for work! One can only wonder at his courage: the man has always devoted himself to his work. He is in extreme old age, and yet, believe me, if he gets hold of some problem, he will not let go until it is solved or clarified. One of his main characteristics is that he can persistently get to the solution of a problem that he has raised. And it is to Khariton that we are indebted in large measure for the development of nuclear weapons in our nation; after all, he is the permanent science director of the nuclear program.

Gubarev: You don't regret what you've lived through?

Trutnev: No. In our generation there was both bad and good. I try to remember the good.

Estonia's Sillimae Uranium Waste Dump Threatens Baltic Ecology

PM0309154092 London THE DAILY TELEGRAPH in English 3 Sep 92 p 7

[Julian Isherwood report: "Uranium Fear For Baltic"]

[Text] A Soviet underwater uranium waste dump in Estonia is threatening the environment of the Baltic—it is only separated from the open sea by a 10-yard dam, a Swedish newspaper said yesterday.

The report gathered on site by Sydsvenska Dagbladet, said that four million tons of uranium ore waste, including 1,200 tons of pure uranium, had been dumped in an artificial lake near the town of Sillamae, 50 miles east of Tallinn, the capital.

Sillamae, which is on the Gulf of Finland, was a closed city until last year because of its apparent importance to the Soviet nuclear industry.

The Sillamae Plant of Chemical and Metal Production, which is still Russian-run, said the uranium waste was deposited under 15 feet of water in the artificial lake.

"Apart from the uranium there are about 1,000 tons of radium, 500 tons of thorium and a couple of million tons of calcium sulphate, calcium fluoride and ash," the company told the newspaper.

"When it's windy, the lake goes all white. When it's calm it's clear," said Mr. Vladimir Nosov, plant laboratory manager.

He said the waste was more than 20 yards deep and 60 feet above sea level.

"Of course there is increased radioactivity in the sea outside the dam," Mr. Nosov said. "But some kilometers off the coast, the levels are normal."

Sillamae first attracted publicity in 1990 with reports of a mass case of inexplicable hair-loss and widespread occurrence of allergies in the town of 25,000.

At the time, Soviet authorities denied that environmental causes made 200 people, including an entire high school class, go bald.

The Sillamae complex was opened in the late 1940's, when it was used to extract uranium from local ore. When Sillamae deposits dwindled, East German and Czechoslovakian ore was shipped there for treatment.

Stolen Radioactive Cesium Believed Smuggled to Estonia

PM1609142392 Moscow IZVESTIYA in Russian 10 Sep 92 Morning Edition p 6

[Yevgeniy Solomenko report: "Deadly Theft"]

[Text] Six lead blocks, each weighing 18 kg, have been stolen from the "Fosforit" association in Kingisepp. Sad to say, thefts from state enterprises, even thefts on far larger scales than this, do not surprise us any more. But this is a special case because the thieves have stolen a deadly load.

These blocks contain cesium-37—a highly radioactive isotope—under a protective layer of lead. It emits 50 roentgens an hour. At "Fosforit" they use it to charge measuring equipment.

So far the investigation has yielded no results. But it is most likely that the stolen goods have been sent to the Baltic. After all, it is just a couple of dozen kilometers from "Fosforit's" gates to the Estonian border. It ceased to be a secret long ago that many tonnes of contraband metal have been leaving Russia for the Baltic via Leningrad and Pskov Oblasts. In Kingisepp Rayon the Ivangorod customs scarcely have time to fill out official reports on the many cases of smuggling Russian raw materials. It is no coincidence that neighboring Estonia, which has no nonferrous metal deposits of its own, has suddenly become one of the world leaders in the export of nonferrous metals in recent times. It only remains to note that the emergency at the "Fosforit" association is not the first such theft of dangerous radioactive substances in Leningrad Oblast.

Communications System To Link Russian-Lithuanian Nuclear Stations

WS0209060492 Vilnius ELTA NEWS BULLETIN No 64 in English 1521 GMT 25 Aug 92

["Security Chain: Finland-Russia-Lithuania"]

[Text] Finnish specialists set to work on creating a system of special direct communication which will connect nuclear power stations of the Kola Peninsula, Leningrad and Ignalina with the centre for radiation protection in Finland. The system will also comprise the Murmansk port where Russian nuclear vessels are based. This system will make it possible to obtain detailed information on the state of nuclear objects in Russia and Lithuania and an emergency situation in them. The new system is to be put into operation this September. All the Nordic countries, including Germany will be provided with the information.

Voronezh Nuclear Power Industry Training Center Profiled

PM2209153392 Moscow Teleradiokompaniya Ostankino Television First Program Network in Russian 1400 GMT 17 Sep 92

[From the "Novosti" newscast: Video report from Voronezh Oblast by V. Ageyev and O. Nidelin, identified by caption]

[Text] [Ageyev] [video shows power station towers] Sad to say, the reliability and operational safety of nuclear power stations is one of the main problems facing the world community. A group of U.S. nuclear power industry specialists has visited the Novovoronezhskiy training center, which trains nuclear power station operational personnel. Today many of the center's graduates work not only at nuclear power stations in Russia and the CIS but also in many West European countries. The aim of the visit to the center was to discuss questions on possible areas of cooperation in improving the skills of specialists operating water-cooled, water-moderated reactor or VVER power units. The sides exchanged experience gained in the operation of nuclear installations of the VVER type. How is the quality of training that the nuclear power station specialists receive today guaranteed?

[V.I. Duvgiy, deputy director of the AES Training Center, identified by caption] The work of our Novovoronezhskiy training center shows that the training received by students at our center and others specializing in different areas ensures operational safety because the student gets a thorough grounding here, his expertise is thoroughly tested, and as a result he then does a thoroughly good job performing his duties at a nuclear power station. [video shows views of power station, people shaking hands, conference room, interview].

Uranium Recovery in the CIS

927F0303A Moscow GORNYY ZHURNAL in Russian No 4, Apr 92 pp 10-13

[Article by V.N. Mosinets, doctor of technical sciences and professor, All-Union Industrial Technology Scientific Research and Design Institute; UDC 622.349.5; For earlier report see JPRS-UEQ-92-004, 16 Mar 92, Science & Technology, Central Eurasia: Engineering & Equipment—Conversion of Uranium Mining Enterprises]

[Text] The uranium deposits of the CIS are very diverse from the standpoints of location and genesis. They may be classified into three broad classes: exogenous, endogenous, and polygenous. The first two classes are of most importance as a raw material base for nuclear power.

The development of uranium ores is a comparatively new sector of the mining industry. It has evolved over the past few years in accordance with demands for the development of nuclear power. The sector is successfully solving many of the extraordinary problems involved in exploiting radioactive ore deposits owing to their special technological characteristics. Included among these problems are problems that other sectors of the mining industry only need to face after 25 to 30 years in view of the more favorable mining engineering conditions and less significant slowdowns in mining operations in those sectors. The special process characteristics associated with the development of uranium deposits include the limited amounts of concentrated uranium reserves in the earth's interior, the complex morphology of most of the ore deposits that are being developed, the inaccessibility of outcroppings of large of ore masses, and the presence of reserves of broken ore in blocks based on elevated radon release factors. As a result of these special features, both poor and very poor ores are being drawn into the development process. Extracting them is only efficient when progressive ore

recovery and fully integrated processing are combined with a high degree of selectivity in ore recovery, field preparation of deposits and quick advance of mining operations to depths of 1,200 to 1,700 m, and provision of comfortable working conditions for miners working in high-temperature stopes in deep levels and in masses that are potentially dangerous from the standpoint of crumps. Radioactive ores are being mined by using modern underground and open-pit mining technologies together with geochemical methods of underground or heap leaching of ores at the site where they lie. These same techniques have recently come into use in the extraction of other metals (gold, vanadium, molybdenum, etc.).

About 56% of all uranium being recovered in the CIS is in exogenous deposits that are being worked in open-pit and underground operations and by the method of underground leaching; 44% is being recovered from endogenous deposits. Polygenous deposits are not yet being developed. Open-pit operations are being used to recover about 18% of the uranium, underground operations are used on about 50%, and underground leaching is being used on about 32%.

Development of Exogenous Deposits of Kyzyl Kum and Caspian Uranium Ore Regions

Open-Pit Operations

A continuous stripping process has found wide-scale use in developing exogenous deposits in open-pit operations. The process involves the use of wheel excavators with capacities of 1,000 to 5,000 m^3/h in conjunction with large spoil dumpers and internal and external spoil heaps. The high operating efficiency of these systems has permitted the profitable recovery of uranium ores with a stripping factor as high as 50-60 m^3/t or more. When host rocks in the form of hard clays, marls, and semihard carbonate rock are developed, the operating efficiency of wheel complexes is increased by the preliminary explosive dislodging of the rocks while preserving their geologic structure. This technique, which we have used for the first time in world practice, has made it possible to place large equipment in the blasted mass. The result has been an increase in systems' productivity by a factor of 1.4 to 1.5 when compared with excavation of nondislodged rock and a cost savings of 20 to 60%. Along with the continuous process, cyclic-continuous and cyclic processes involving conveyer and motor vehicle transport are also being used at these open-pit mines. One effective means of reducing the transportation costs involved in uncovering and working the deep levels of such open-pit mines has been the use of a system of engineering solutions related to creating transport and spoil heap earth-fill coffer-dams erected perpendicular to the front of the stoping and connecting the stripping and mining benches with the tiers of the internal heaps. Given the specified zoning of an open-pit field, this technique reduces transportation costs by 25 to 40%.

On exogenous deposits that are relatively simple from a morphology standpoint, stoping is conducted by using both wheel and bucket excavators equipped with radiometric devices that are intended for the following purposes: guiding machines' excavating parts along a seam boundary, in-stope radiometric ore sorting, and reducing losses of and impoverishment of commercial minerals.

Underground Development of Exogenous Deposits

Shield methods of sinking shafts through high-head aquifers with thermal waters that entail the use of preliminary water-table lowering, shield methods of sinking permanent and development workings, and general methods of predrying deposits through the use of drainage levels that have all been specially developed for the underground development of exogenous deposits have all found wide-scale use in the underground development of exogenous deposits. Continuous-cyclic processes have been successfully introduced in stoping. These processes involve the working of paired or single faces and entail the use of the following equipment: OMKT, KM-70, KM-87, and OKP mechanized and waterproofed stoping complexes for seams more than 1.5 m thick (including when two layers are worked after the caving and consolidation of the rock in the first depleted layer); OKP and OKM complexes with active roof support for seams less than 1.6 m thick; BSha-1, BUG-3, and BUG-3M drill and conveyer rigs; and AM-1 shaving units for seams 0.8 m thick. The special technological features of working under conditions of a "false" roof have entailed a number of specific engineering solutions related to active support of the roof while the waterproofed lining is moved. A number of systems used, including drilling and conveyer rigs, are equipped with radiometric devices to guide their excavating parts along seam boundaries. One particular problem demanding research and technical solutions in this problem area was that of working other inclusions, i.e., carbonate and sand formations. The problem was solved by the use of cone-type mechanical excavating parts.

Underground Leaching

Underground leaching of exogenous deposits is the most profitable method of developing poor uranium ores under complex geological and mining conditions in which the use of both underground and open-pit uranium recovery methods is unprofitable. Thanks to the fact that lean uranium ores that lend themselves to leaching have been brought into the development process, underground leaching of exogenous deposits has significantly altered general thinking regarding uranium reserves and the prospects of providing a raw material for nuclear power for the long-range future. This is because, without any need to create a significant infrastructure, transportation, processing complexes, or tailings dumps, underground leaching has created the conditions required for highly profitable development of the poorest but at the same time biggest deposit reserves while also resulting in a two- to threefold reduction in capital outlays and a five- to sixfold increase in the productivity of the labor required to achieve a finished product.

The fact that comparatively deep deposits in the form of narrow elongated beds concentrated in weakly permeable rock have been brought into the development process is one special feature characterizing the development of underground leaching in recent years. The following measures have all facilitated increases in the efficiency of the underground leaching of uranium ores and the expansion of the scales on which it is used with exogenous deposits: 1) the switch from the airlift to the pump method of pumping solutions out by using high-capacity immersible electric pumps, improving the hydrodynamic conditions of

pumping solutions in and out, optimizing the network of prospecting and operating holes, using pulsing operating modes, and creating vertical and horizontal seepage-resistive curtain walls and 2) the development of artificial cracking in poorly permeable ore by using engineering techniques such as explosive effects, increasing the diameter of filter zones, and creating and installing new equipment (polyethylene and fiberglass-reinforced plastic tubes and disk filters) and processes (bringing up solutions without the use of pipes). The successful solution of the problems of protecting the main components of the environment both in processes of natural neutralization of solutions and by artificial reclamation of the earth's interior have given underground leaching techniques a number of ecological advantages as well.

Development of Endogenous Deposits

Open-Pit Mine Operations

The open-pit mining operations entailed in the development of the endogenous deposits of the Streltsov, Kokchetav, and Balkhash uranium ore regions are conducted primarily by using cyclic stripping operations with much lower stripping coefficients than in the case of exogenous deposits. The high efficiency of developing endogenous deposits is due to the use of combined motor vehicle and railroad transport in deep levels, which reduces transportation costs by 20 to 25% when compared with transport by motor vehicle alone. Increasing the height of the stripping benches being drilled off to 25-30 m and separating them into approaches during the excavation after the blasting and configuring the equipment on the blasted rock mass is one effective solution from the following standpoints: concentrating mining operations; maintaining the breadth of worksites at deep levels; and ensuring the efficient independent operation of drilling, loading, and transport equipment in space and time. The separation of high blasted benches into approaches is especially important for deep open-pits developing complexly structured uranium deposits. The complex structure of endogenous uranium deposits, where variations in thickness prevail over one average thickness and where one average content prevails over variations in content, has necessitated the introduction of a hierarchical systematization of their component structures that in turn dictates the level of selectivity and stope averaging of the ores. Ore bodies are at the lowest level of this hierarchy followed by ore beds, ore zones, and ore deposits. In addition to simplifying the understanding of a deposit's structure, this increase in hierarchical level of selectivity generally leads to an increase in the efficiency of developing deposits as well. The development and introduction of a blasting process that preserves ore bodies' (beds') geological structure with a loosening coefficient of 1.05 to 1.12 cuts ore losses by a factor of 1.5 to 2 and reduces impoverishment by 40 to 45%. This in turn results in a decrease in the stripping coefficient, the amount of transport, and the yield of enrichment tailings, as well as in a significant expansion of the boundaries of open-pit operations. As during stripping operations, conditions are created for a significant increase in the height of drilled or blasted ore or mixed benches that are separated during excavation into approaches with equipment set up on the blasted mass. Equipping mining excavators with radiometric sensors mounted on their buckets permits preliminary scanning of ore stopes before they are selected for excavation, as well as in-stope averaging of ores with radiometric sorting, which sharply reduces ore loss and impoverishment.

One important condition of effective work in open-pit mines developing endogenous deposits is that the long-range stability of the open-pit mines' sides be guaranteed. This is achieved by optimizing the directed deepening of open-pit mines and by the possibility of using lasting antirot treatment on those sides that will be excavated last, as well as by using different engineering methods of reinforcing the sides of open-pit mines by cementing, clay grouting, and local dewatering of benches and by reinforcing them with reinforced concrete piles and tension bars, which increases sides' stability by 20 to 30% and thus makes it possible to reduce the stripping coefficient.

Underground Mining Operations

Underground mining operations on endogenous deposits are being conducted during the development of uranium ores on the largest scales in the Karamazar, Stavropol, Krivoy Rog, Kirovgrad, Balkhash, Kokchetav, and Streltsov uranium ore regions. The main directions of their development involve a high concentration of mining operations, complete mechanization of the entire production cycle, and scientific organization of miners' labor. A high concentration of mining operations is achieved even in the stages where ore mines are opened by the simultaneous multicascade opening of deposits with the organization of concentration levels at economically feasible marks combined with independent stoping in each of the cascades, consolidation of mine fields, group opening and preparation of levels, increasing the height of levels from 25-60 m to 90-120 m, and other engineering solutions. Conducting the operations in a cascade from the bottom up and burying the lower levels of barren rock, balance ores, and enrichment tailings from the upper levels in the worked space (during filling) creates the conditions for no-waste production. Concentration of mining operations in the stoping stage with an increase in the load on working levels and cleared faces (and reducing the number of such blocks that are worked simultaneously) is achieved by consolidating the parameters of cleared blocks, increasing chambers' widths and lengths, group panel preparation of blocks, using a continuous extraction procedure instead of separate extraction, increasing the height of blocks and the height of sublevels, and working simultaneously on two or three sublevels in a level with a system of horizontal layers involving filling, organizing the labor of teams of miners based on a multiple-stope scheme, and other engineering solutions. Also important is the use of modern self-propelled waterproof electric drilling and loading-and-transport equipment, vibratory conveyers, and entry driving complexes for drilling rise headings. One special feature of conducting mining operations in complexly structured endogenous uranium deposits is the need for nearly universal use of development systems with hardening filling owing to the need to fight losses and impoverishment of ores, limit radon emission, and reduce to the maximum degree possible deformation of host rock and ore masses in order to avoid elevated radon emission into the ore mine atmosphere when the rock leaks. In view of these facts, the uranium of the development systems used

has changed significantly in recent years: systems of subdrifts or cross-cuts with subsequent hardening filling, systems with sublevel storage of ores and subsequent replacement of the said ores by filling when they are removed, and systems of slightly sloping layers with filling have replaced systems of layers and sublevel caving and level-and-chamber systems with forced caving of the roof. In addition to permitting more complete extraction of commercial minerals, these development systems are more convenient for mechanizing primary and auxiliary production processes. At the same time, they provide maximum labor safety for mine workers. One consequence of using such systems has been the possibility of wide-scale mechanization of the labor involved in stoping operations based on the use of self-propelled equipment, complexes to drill rise headings, and vibratory feeders and vibratory conveyers when removing ore, including equipping chambers up to 120 m high with mechanized bottoms, sharply reducing lining operations and the use of scaffolding, and increasing the speed and reducing the relative amount of preliminary mining operations. Using the specified systems in conjunction with high-capacity equipment has made it possible to reduce the mining operations at superlarge deposits at high rates of speed. This in turn has necessitated the solution of a number of new scientific-technical problems entailed in conducting mining operations at deep levels. The general principles of conducting mining operations at great depths under conditions of the dynamic manifestation of mine pressures are by and large well known and may be reduced to the following: adhere to a straight front when conducting mining operations, reduce the jaggedness of the rock mass, eliminate cranches subjected to a high concentration of local stresses, and provide for regional and local relief of rock masses. Despite the fact that these principles are generally well known, further improving stoping processes to ensure that they are safe at great depths requires deeper study of the manifestations of mine pressure, a search for methods of controlling the properties of rock en masse, and the creation of new techniques for forecasting the state of a rock mass when conducting development and stoping operations. A high degree of mechanization has also been achieved in operations at the surface of ore mines, where automated and mechanized car exchange systems are used extensively and where space-planning decisions regarding the configuration of ore mines' surfaces have been improved. There has also been a significant improvement in the rates at which shafts are sunk based on the use of a sinking technology involving sinking the lining in a thixotropic sleeve. The use of sensors on the bodies of self-propelled loader-conveyer machines, combined with the separation of streams of commercial ores and ores of balance and barren rock in the earliest stages of their movement, has made it possible to sharply reduce ore losses and impoverishment and has, in conjunction with ore inspection stations at ore mines and enrichment of ores at radiometric factories, made it possible to sharply increase the efficiency of extracting ores from the earth's interior and to complete the processing of the balance portion of ores and enrichment tailings by heap leaching methods.

Underground Leaching

Underground leaching of the endogenous uranium ore deposits of the ore mines of the CIS is being used mainly in conjunction with conventional mining operations in the stages of assimilating deposits (in the Kokchetav ore region), in side and balance segments simultaneously with the main mining operations (in the Streltsov uranium ore region), and when finishing off work on deposits (in the Stavropol and Karamazar uranium ore regions). These are only a few examples of the independent use of underground leaching to work deposits as a whole. The use of the conventional system of opening and preparing ore beds during the underground leaching of endogenous deposits is efficient only in the stage of cutting and preparing the blocks, when most of the ore is left in place without being brought to the surface. Improving the process of preparing ore bodies during blockless extraction, optimizing drilling and blasting operations, and ensuring a high degree of crushing of the ore and optimal filtration uniformity of the broken-off ore masses will make it possible to achieve uranium extraction at a level of 70 to 75%, and using repeated blasting operations will make it possible to increase extraction to 90-92%, which will place underground leaching of ores that lend themselves to leaching on a par with conventional mining operations and, in some cases, on an even higher level.

The uranium ore recovery methods examined make it possible to use a high percentage of geological reserves of uranium and other valuable accessory elements, as well as simultaneously recovered barren rock and mine waters when recycling them in hardening filling so as to create no-waste or low-waste processes. The development of nuclear power engineering, even on a reduced scale, has posed great problems for the uranium recovery industry of the CIS. Under the conditions of the complication of the overall socioeconomic situation and geological-mining and mining engineering conditions, these problems can only be solved by introducing the most advanced scientific-technical progress and by a steady increase in labor productivity at a pace exceeding the rate of the complication of the conditions of uranium mining. Solving these problems will, given a developed uranium raw material base, permit highly efficient recovery of uranium for many years to meet the demands of both the domestic and foreign markets. This is especially true in view of the fact that not all known uranium ore regions have yet been included in the development process.

[Advertisement appearing on p 13]

Conversion Into Action

For the first time in the history of the development of the uranium industry in our country, a group of specialists working under the direction of Academician N.P. Laverov has prepared a report entitled "The USSR Uranium Raw Material Base." It was presented to the technical committee of the International Atomic Energy Agency [IAEA].

The report contains in-depth examinations of the problems of the creation and development of the uranium raw material base, the main uranium ore-bearing regions and regions that hold the promise of containing uranium, and commercial-genetic types of uranium deposits. The spatiotemporal laws governing the distribution of uranium

deposits and resources within the territory of the CIS have been specified. For the first time, a quantitative and qualitative estimate of the Commonwealth countries' total uranium reserves and resources has been given. The report materials will be published in IAEA's next scheduled "Red Book" in autumn 1992.

The report will be of great interest to specialists involved with problems of world uranium reserves and the geology and technology of developing uranium deposits.

The report (71 pages, 26 figures) is currently being edited and copied in Russian. It will be sent in brochure form to interested individuals and organizations upon receipt of the required payment.

The cost of a single copy is 280 rubles.

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The Atom: Looked at From Other Points of View

927F0274A Alma-Ata QAZAQ ADEBIYETI in Kazakh 20 Jun 92 p 14

[Article by Kamal Smayylov: "The Atom: Looked at From Other Points of View"]

[Text] We are approaching a time when Kazakhstan will no longer be called the hearth of nuclear catastrophe, "region of atomic wastes," "uranium empire." This is a source of rejoicing for us all. However, the thought occurs that we should now, at a time when the noise has died down, when the rumbling has ceased, approach in another way with restraint and intelligence, those manifestations, those things which were done in the past without us, without our agreement, and look at them in terms of the interests of an independent country.

A meeting-discussion of journalists and scientists recently held in Aqtaw City encouraged us in this idea.

Some 30 percent of uranium reserves found in the territories of the former Soviet Union are found in Kazakhstan. Until recently, Kazakhstan, which produced most of the uranium not produced from native resources, delivered 55 percent of the ore produced in the Soviet Union. In addition, more than half the nuclear materials for Soviet nuclear weapons were manufactured and armed from Kazakhstan resources.

Fifty years of uranium prospecting, and uranium production began in a hurry. The first exploitable uranium deposits were found in Qorday in the southern part of Kazakhstan. The ores were refined in a Kirghiz factory, and uranium concentrates were produced. At the end of the 1950s, uranium was discovered in eastern Kazakhstan. Uranium ores taken from Belogorsk were enriched, and prepared uranium fuels were manufactured from them in the Ulbi factory in Oskemen.

Later, during the 1960s, uranium was discovered at Aqmola in central Kazakhstan, and production began. A giant combine was built in Stepnogorsk City to process it.

At the end of the 1960s, a very large uranium producing combine came into being in Aqtaw City, along the Atyraw. Five mines operated as part of it.

A great deal of uranium has been found in the low-lying steppe. Mines have been put into use at Sozaq, at Tawkent, and at Tawbulaq, in Shymkent, at Aqsuyek in Zhambyl, at Shalqiya (near the Qarazhal), and at Koktas (near Lake Balqash), in Zhezqazghan Oblast. Uranium mines are operating in Aqmola and Kokshetaw at Shangtobe (80 versts from Atbasar), at Selewti (near the Aqsu), at Shoqpaq (43 versts from the Yesil) near Aysary Settlement in Engbeksiler Rayon, at Syrymbet (Volodar Rayon). Thus Kazakhstan is full to bursting with uranium mines. Some 90,000 persons work in them. There are no Kazakhs.

In general, persons work in the uranium mines for several years, until retirement age. Exerting its influence on this is the fact that wages there are higher than anywhere else. However, if the health of the workers is harmed, they do not have to put up with it. The doctors will not let them.

However, we must move away, to some degree, from the attitudes and fears which have calcified in our minds, crept into our souls, and permeated our bodies regarding the uranium mines, and show respect for the truth.

More than uranium is mined in the mines. In areas where there is uranium ore there also occur gold, silver, and also rare earths such as scandium, rhenium, cobalt etc.

Our uranium reserves are very great. They are enough for many years. To be sure, our ores are poor in comparison to those of neighboring countries. However, uranium was first found in Kazakhstan, and since that time the uranium industry has flourished there. We can sell uranium to other countries. A ton goes for 4,000 dollars. Recently, the demand for uranium on the international market has decreased in connection with nuclear disarmament. However, we must not pause in producing and refining uranium, or stop producing and refining it.

Kazakhstan is one of the world's eight nuclear powers. This is fact. There are some very powerful weapons: there are 1360 nuclear warheads on 104 ICBMs. This is one-eighth of the nuclear weapons of the former Soviet Union. This is more than the nuclear power of France and England. This is no easily created power, no richness which has come to us for free. We know indeed that the cost of Soviet nuclear weapons, which have frightened the world, awed enemies, keep them under control and preserved world peace, is equal to that of the former Great Patriotic War. Now the task of the entire Soviet people is never to under-value this arsenal created by our knowledge. In any case, Kazakhstan has made its contribution to this capacity. It has not just made its contribution, but a rich contribution!

However, our scientist-physicists have said that we cannot test these weapons except in small quantities under very safe circumstances. Thus, life suggests something suddenly. In any case, in the future, when the danger has decreased, and when nuclear weapons have been destroyed in the entire world, the discussion will be altogether different. The heart of nuclear bombs is the nuclear explosive called plutonium. This explosive must be

renewed and changed every 10-15 years. However, one tenth must be renewed each year and old exchanged for new fuel-explosives.

While we produce the fuel needed for such bombs, we also have factories making the casings for nuclear bombs. All of them are in the famous Ulbi Metallurgical Plant. There are not a few of them in the area. To be sure, caution is needed. Kazakhstan, which already stores nuclear weapons, needs plutonium and beryllium!

Plutonium has hitherto been produced by and large in Russia (a little at the Ulbi Factory). Russian does not provide it for free now. Doctor of science S. V. Skolnik answered as follows when I asked if the ash, the plutonium produced in the fast neutron reactor operating in Kazakhstan at Aqtaw due to the consumption and burning of U-238, could be used to renew and replace the explosives of nuclear bombs: "This is unexplored terrain. We will have to think about it. It is a difficult question."

We have an enormous nuclear power. We must put effort and money into maintaining it. It is not something free. We cannot just be haughty about being a nuclear power. We must know how to maintain this power. Are we ready to do so? Kazakh cadres are as good as absent in the field of nuclear energy. Kazakhs are not drawn to it since "they know nothing about nuclear reactors, and do not go to the uranium mines."

There are two centers in Kazakhstan controlling the rocket silos. The first is at Zhanghyztobe in Semey Oblast and the second is at Derzhavinka village in the Torghay region. Our more than a hundred silos are essentially concentrated in those two areas. Is this not something we could not write or speak about, or even be aware of before?

Likewise, one of the nine radar stations observing the sources and targets of intercontinental rockets with nuclear warheads, a very powerful one, is in our Kazakhstan, at Sarysaghan beside Lake Balqash.

If we reject all of this saying "its all very remote," and if we push it away, then this will not be using our heads, or drawing upon our experience.

Indeed, we are finding out only now, not only about the great thermonuclear explosions which shook the earth and overturned the heavens in Semey in those years of secrecy, but about scores of other "small" nuclear explosions and rumblings. In a speech which took place in Aqtaw, a scientist laid out his map and catalogued what kind of explosions or rumblings took place where and when. There were more than a score of powerful nuclear explosions at Azghyr in the Atyraw region between the years 1966 and 1979. He said that the explosions had taken place to open up and explore the gas deposits at "Qarashyghanaq." Then there were a few rumblings and explosions called "Meridian" along a line reaching from Shymkent to Torghay Oblast. A few very large explosions were focused on Eastern Kazakhstan (they were said to be for the purpose of exploiting deposits of ores), given the general name "Lazurit." The facts and circumstances of the "Region" explosions in Qostanay, and of the "Batolit" in Aqtobe, are known only to physicists and geologists.

All of this was formerly kept secret. Now it is said that all were for purposes of the people's economy. Seismic investigations were carried out with the help of those nuclear explosions. By examining waves produced by subterranean explosions at a depth of 700-800 meters, it was possible to determine whether there was oil or gas or not, and under what conditions. It is said that a few sources of minerals were discovered in this way, and that the size of resources was determined. At present the persons and organizations who carried out the explosions are gone. Both those who managed such tests, and carried them out are no longer among us. What good will accusing and punishing them do? We must press on. We must look ahead!

Thus the question of how we will proceed, and what our goal will be must stand before us. From this point of view, the 15 May edict of Kazakhstan President N. Nazarbayev had a special place, and was extremely important. According to the edict, a nuclear research center is being established in Kurchatov City, and we must expend one benefit, which does not come from everyone, and go to everyone, for another.

What must we do to guarantee the safety of nuclear energy? The people do not believe the claims of scientists that it is possible to have a safe nuclear power station or reactor in the world. After the Chernobyl disaster the people have lost confidence. The nuclear power plant in Armenia has been shut down, and this has in the end necessarily resulted in energy shortage. The people are against the building of a Crimean power station. In general there is a great deal of nuclear fear in our country.

The accidents which have occurred in power stations are not just due to technical and technological defects and failures, but also due to the mistakes and incompetence of the people working in them.

What we must do now is to create conditions which do not allow accidents to happen, despite the incompetence of those persons managing and in control of the plants, and even if they make mistakes, or do not know what to do, by stopping and cooling down automatically dangerous components of the reactors.

A reactor called "Aqtaw," which can in this way guarantee its own safety, is being planned in Aqtaw City. It will work by fast neutrons. Its capacity will be 200,000 KW. If such reactors overheat, there is equipment to cool them down, and then stop the reaction.

The primary costs for the power produced by a nuclear power plant are 2.2 times less than for gas, 1.8 times less than for fuel oil, and 1.3 times less than for coal. This is not the only issue. Organic fuel resources in the earth will suffice for half a century at most. However, nuclear fuels will not run out. Nuclear power is not only profitable from an economic standpoint, it is also particularly harmless in ecological terms. The sulfuric acid, nitrous-oxide, carbon dioxide, ash and cinders, which now disperse in the air and pollute the environment, will not exist if we rely on nuclear fuel.

To be sure, there is another problem, another danger of nuclear power plants. This is the problem of preventing harm to the environment, and storing the wastes left behind from burning nuclear fuel. For example, at the

Aqtaw Nuclear Power Plant, only 10 percent of the nuclear fuel is burned to perform the basic work of the plant and the remaining 90 percent becomes "waste." We previously sent the wastes to Russia, or to Kirghizstan, and stored them there. They now refuse to receive them. If we intend to produce uranium, and have a nuclear industry, then we must ourselves store the "natural" wastes we produce and look for ways to make them harmless. Recently, the issue was raised of building "mausoleums" in Kazakhstan, to store wastes from six sites, but the people were against it. However, life has shown that we will have to build such "mausoleums." The wastes cannot be stored by being put out on the open steppe, or hidden in water. Wastes placed in the steppe would be blown by the wind and spread into the environment. Wastes placed in a lake would be spread by ground waters to a distance. Liquid wastes from uranium and nuclear production are collected and stored in Lake Qoshqarata near Awtaw. According to what the scientists have said, the lake is connected to the sea by subterranean waters, and there is a flow. For that reason, we must build and utilize "mausoleums," specially built and scientifically based. Radioactive elements in those wastes decay over hundreds of years and break up into their components. For that reason, they should be stored deeply, in natural caves which protect the environment with rock. Sometimes such wastes are put into the subterranean mines where the uranium itself was produced, and stored there.

Indeed, a people in an uproar and fearful of a nuclear accident, those who have little knowledge or understanding about the nature of the atom, are making noise, and are against nuclear energy. The people need understanding, need knowledge. To refuse to participate is easy, to find a way to participate is difficult. The number of centers of radiation in Kazakhstan now exceeds 30,000. The problem now is not slowing down or stopping the nuclear industry, but of utilizing it in a safe manner. It is discussed and reported in the papers that the people are against construction of nuclear power plants. It is said that oblasts need energy like they need air. Atomic power plants which bring death are not needed at a time of difficulty and adversity. But in such difficult circumstances how will things be easier if we are without energy? People say, if we have no nuclear power, must we not find energy sources using wind, or sunlight? They do not know how expensive such energy is.

It is planned to build a nuclear power plant in Shymkent. There is opposition. It has been suggested that a nuclear power plant be built in Zhezqazghan. The people do not agree.

In the 40 years that nuclear reactors have been operating, 69 persons have died in the world due to damage caused by nuclear reactors, and 25,000 persons have become ill. However, 60,000 persons a year die due to automobile accidents alone. Nuclear power plants are in 49th place among those things shortening human life. Thus it would seem appropriate to build stations with smaller reactors, and to make them subterranean. Building future nuclear power plants in Atyraw, Eastern Kazakhstan, Semey, and Tselinograd Oblasts, where there are nuclear production facilities, is possible...

Indeed, the Semey testing area is now utilized for peaceful purposes, for the good of man. There are two subterranean nuclear reactors in Kurchatov City. It would be proper to use them for major scientific purposes. The way is open for the reactors to deal with problems of the mastery of high energy plasmas, of obtaining special materials resistant to radioactivity, of manufacturing special nuclear motors for space flight. A program, a system for nuclear energy, must be created in Kazakhstan. To this end a nuclear agency must be created.

What will the future be like, and what will the direction of change be? Indeed, it is no easy thing to gain the power of the atom, master it, and put it to work. Indeed, the atom is dangerous. It is quite possible that human beings will become its victims. But even if this is so, because fires may break out does not mean that human beings do not use fire. Certainly not! Bearing this in mind, we must take a different view of the atom, and not think of it in terms of weapons, but in terms of energy.

Energy Provision to High-Volume Synthetic Liquid Fuel Production From Fast Neutron Nuclear Power Plant

927F0299C Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 34-36

[Article by B.F. Gromov, V.G. Kozlovtsev, G.I. Sidorov, M.F. Troyanov, V.V. Chekunov, A.A. Krichko, V.V. Stekolnikov, V.S. Stepanov, Energy Physics Institute, Fossil Fuels Institute, and Gidropress Special Design Office; UDC 621.039]

[Abstract] The reorientation of the energy resource base from oil and gas to coal calls for implementing the methods of fuel beneficiation and synthetic liquid fuel (SZhT) production; in essence, this technology amounts to enriching the coal breakdown and conversion products with hydrogen. The use of nuclear reactors for supplying synthetic liquid fuel production with energy is discussed and the development of a 500 MW reactor module with a safe fast neutron reactor is considered. The principle of reliable internal self-protection for any type of reactivity control system emergency is outlined and the principal technical and economic indicators of a nuclear power plant for supplying energy to synthetic liquid fuel production are summarized. An analysis demonstrates the feasibility of such nuclear power plant synthetic liquid fuel production. It is stressed that an additional detailed study of the problem with respect to a specific coal deposit is necessary for its implementation and should be carried out in the framework of international scientific and engineering cooperation. Figures 2; tables 1; references 8: 7 Russian, 1 Western.

Ensuring Seismic Protection of LFR-300 Reactor

927F0299B Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 13-20

[Article by A.M. Savostyanov, Scientific Production Association imeni S.A. Lavochkin; UDC 621:699.841]

[Abstract] The frequency, severity, and unpredictability of earthquakes and the catastrophic consequences of such an event affecting a nuclear power plant necessitate the task of lowering the cost of antiseismic measures while ensuring the strength and stability of buildings and structures. This task can be solved both by improving the design methods and selecting efficient quake-resistant structure designs. The problem is further complicated at nuclear power plants due to the need to guarantee not only the structural strength but also to ensure the reliable performance of all AES systems, primarily the reactor shutdown cooling system intended for lowering the nuclear process temperature and activity to a safe level. For illustration, the measures stipulated for ensuring the seismic protection of the LFR-300 reactor are outlined and such elements as seismoactive spacers, pneumatic and hydraulic shock mounts, and pliable layers are considered. The importance of nuclear power plant siting is discussed and the seismic characteristics of five containment structure versions are summarized. The expediency of underground nuclear power plant siting supported by the late Academician A.D. Sakharov is emphasized. The use of existing missile silos and hardened command centers made available by the conversion for placing nuclear reactors is recommended. Figures 6; tables 1; references 9.

Issues of Arrangement and Building Practices During Underground Nuclear Power Plant Construction

927F0299A Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 7-12

[Article by O.V. Koltun, Yu.B. Nikolayev, P.D. Stepanov, B.K. Pergamenshchik, Moscow Energy Committee, VNIINTPI, and Moscow Civil Engineering Institute; UDC 621.311.25:621.039.69.035.4]

[Abstract] The difficulty of arranging nuclear power plant (AES) units in the case of underground siting due to a possible conflict with earthmoving and excavation practices and the problem of practical feasibility of such underground structures are discussed and the principal requirement imposed on the underground AES (PAES) arrangement—the most compact production and auxiliary unit arrangement possible—is formulated. The importance of bringing generating units on stream successively and ensuring their operation while other units are still under construction is stressed and the peculiar problems of meeting these requirements for PAES's are outlined. The principal factors which must be taken into account in selecting the PAES arrangement are described in detail and PAES layout versions and excavation and tunnel driving are cited. It is shown that an underground nuclear power plant chamber can be excavated and concreted (at a rate of 14-16 thousand cubic meters a month) in 4 years. Figures 3; tables 1; references 3.

Operating Experience of Hydroelectric Generating Sets at Zeysk Hydroelectric Power Plant With Diagonal Flow Turbines

927F0300A Moscow GIDROTEKHNICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 41-44

[Article by L.N. Dudchenko; UDC 621.311.21.004]

[Abstract] The principal operating data on the six turbines installed at the Zeysk hydroelectric power plant in the past 15 years are summarized and the operating state characteristics of the hydroelectric units over the past 12 years are described. In so doing, attention is focused on the vibration monitoring in operating hydroelectric units (GA) and the parameters which must be measured in order to asses the vibration status of the hydroelectric sets; reclassification of hydroelectric generating sets; and damage to the impeller chambers of diagonal flow turbines. The frequency response of the Zeysk power plant hydroelectric unit operating into a load is plotted and the results of special studies of diagonal flow turbines carried out at the All-Union Scientific Research Institute of Hydraulic Engineering imeni B.Ye. Vedeneyev are outlined. The conclusion is drawn that vibration diagnostic departments must be set up at large hydroelectric power plants for monitoring the main and auxiliary equipment and that in reclassifying hydroelectric sets for a higher installed capacity, it is necessary to check the control system warranty under load shedding and bus faults. Moreover, the voids in the impeller chamber and the turbine operation in the propeller mode at a startup head affect the chamber's normal life. Figures 2; tables 1; references 3.

Technical and Economic Problems of Wind Energy Utilization

927F0299D Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 48-53

[Article by A.P. Korshunov, Yu.A. Kolosov, All-Union Scientific Research Institute of Agricultural Electrification; UDC 621.311.24]

[Abstract] The history of the on-and-off wind power plant production for agricultural needs in the former USSR since World War II and the tendency to overstate the wind power plant (VEU) capacity (which caused many people to treat such devices with justified suspicion) are reviewed and the most common errors and shortcomings in wind power plant efficiency analyses are examined in order to help designers and researchers in the field of wind power to avoid such errors in the future. The methodological rigor and confidence of the results of wind power feasibility studies under the conditions where new forms of property are springing up and profit is the principal driving stimulus for using any equipment are stressed. The principal underlying premises and approaches to developing an efficiency evaluation procedure are considered in detail; in so doing, attention is focused on wind power plant uses as the most economical and ecologically clean energy source, wind power plant applications for displacing petroleum products, and development and implementation of new wind power plant designs in place of the old ones. A procedure for performing energy power utilization feasibility analyses is suggested and it is noted that at today's level of science and engineering, wind power plants have limited applications due to the high cost of power plants. It is speculated that in the next 10-15 years, wind energy will be utilized primarily in agriculture and irrigation. References 3.

On Utilization Expediency of Wind Power Plants in Khabarovsk Kray

927F0299E Moscow ENERGETICHESKOYE STROITELSTVO in Russian No 6, Jun 92 pp 56-59

[Article by L.G. Ovis, Russian-Dutch Joint Venture; UDC 621.311]

[Abstract] The outcome of the wind power plant marketing effort carried out in Khabarovsk kray in 1989-1990 is discussed; in the course of the campaign, the demand for wind power plants is analyzed on the basis of information charts produced by the Vetroenergetika computer-aided database system in order to justify the positioning of orthogonal wind power plants in the kray. The procedure for analyzing the information charts is outlined in detail and an example of a flow chart is cited. It is suggested that existing diesel power plants be complemented with wind power plants with a lower energy production cost. To this end, V.M. Lyakhter's VL-2N-130 and VL-2N-1000 units with a 130 and 1,000 kW power are suggested. The arguments in favor of these power units are analyzed and the energy characteristics of the units as well as the siting chart for the Sovetskaya Gavan area are plotted. For illustration, a 10 MW VES-10 power plant consisting of ten VL-2N-1000 units is considered and its electric circuit diagram is presented. The need to analyze all existing data on wind power plants produced in other countries is stressed and the feasibility of using the VL-2N-130 and VL-2N-1000 orthogonal wind power plants for cogeneration together with diesel power plants in Khabarovsk kray is confirmed. Figures 5; tables 2; references 2.

Production Capabilities and Development Outlook for Rotational Forming by Elastic Medium

927F0323B Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 6-7

[Article by I.M. Zakirov, Kazan Aviation Institute; UDC 621.981.21.001]

[Abstract] Expanding uses of rotational forming by elastic media, mostly for bending, and the advantages of the method are discussed and the production capabilities and development outlook for rotational forming by plastic media are evaluated. It is noted that in the past, the principal trend in the development of rotational forming equipment was toward developing universal machines. It is speculated that future trends will center in developing specialized machines for large-scale production due to the following factors: rotational machines are convenient for charging and discharging the bent blanks, have a high productivity, require a lower force than stamping or forging, and ensure a higher attachment resistance. At the same time, the issue of increasing the versatility of existing rotational machines for forming by elastic media and bending parts with a variable curvature remain urgent. The use of elastic mandrels for dual-roll machines with elastic roll covers having different rigidity is examined. The dependence of the part's residual radius of curvature on the indentation depth is plotted for illustration. It is shown that rotational forming capabilities can be expanded by developing new machine designs which ensure a pressure close to that used in stamping. Figures 2; references 6.

Specialized Dual Roll Machines

927F0323C Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 8-9

[Article by A.V. Nikitin, I.M. Zakirov, Kazan Aviation Institute; UDC 621.981.21.004]

[Abstract] The need to improve the quality of cylindrical and tubular parts used in consumer goods (TNP) production and ensure their continuing competitiveness call for implementing new advanced production methods and developing highly efficient equipment. In some cases, it is more expedient to take the path of specialization and develop dedicated machines for making one of two types of items. This principle is illustrated by a series LGME sheet bending machine which meets the requirements of dedicated equipment, i.e., a low cost of production, simplicity of design, and efficiency in practical applications. The dual roll bending machine has a constant spacing on centers and utilizes elastic roll coatings. The advantages of dual roll machines with elastic roll covers over three-roll rigid machines are outlined and other roller sheet metal bending machines developed on the basis of this principle at the Kazan Aviation Institute are described: LGME-0.1-KAI, LGME-0.1m-KAI, and LGME-0.2-KAI. Development of new series LGME machines utilizing a similar bending principle is reported. It is shown that the design simplicity and the resulting relatively low cost of these machines combined with their elevated reliability, high quality of parts, optimum overall dimensions, and operating convenience make these machines highly profitable and accessible even to small enterprises and cooperatives. Figures 5.

Automation of Part Bending by Elastic Medium in Rotational Machines

927F0323D Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 9-12

[Article by A.V. Sosov, Kazan Aviation Institute; UDC 658.52.011.56:621.981.21.001.24]

[Abstract] Increasingly stringent requirements imposed on the production efficiency of pipe sections at aerospace enterprises under the conditions of small-batch multiple-item production call for comprehensive automation of the entire process cycle. The most difficult stage in the integrated automation process—welded pipeline fabrication from high-quality tube blanks produced in a dual-roll LGME-1.6-KAI metal sheet bending machine with elastic polyurethane forming roll coats—is considered and the manual operations which must be automated are identified. A formula is derived for calculating the automation level of the bending process and the specific process parameters. A block diagram of automatic two-pass bending process control and diagrams for finding the maximum blank length formed in one pass are cited. The minimum sufficient number of mandrel rolls is calculated by iterations allowing for a permissible 10% spread of mechanical characteristics ensuring the necessary overlapping of blank edges before welding. Likewise, the maximum tube blank radius for a blank with the minimum rigidity is calculated, resulting in a series of mandrel roll radii and the corresponding curvature radii of the neutral layer of tube parts which can be made in these rolls. Figures 5; references 5.

Friction Plate Production Process for Agricultural Machinery Cutting Tools

927F0323E Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 12-13

[Article by S.G. Gumirov, I.V. Zverev, Kazan Aviation Institute; UDC 621.77.016.2.002]

[Abstract] The shortcomings of existing processes of making eight versions of five models of single- and double-sided friction plates for the cutting tools widely used in agricultural machinery prompted the development of a new process which makes it possible to manufacture friction plates with two longitudinal edges. As a result, when one plate edge is worn out, the plate is switched around and is operated until the other side is completely worn out, making it possible to double the service life and sharply decrease the metal consumption due to waste. The specific operations involved in making friction plates under the new technology developed at the Aircraft Fabrication School of the Kazan Aviation Institute using the PG-4 section roll forming machine are outlined in detail. Tests of pilot batches show that the friction plates meet the requirements of GOST 3497-74. Under commercial conditions, the plates are made in model SPK-300M strip rolling mill using two 100 kW, 8,000 Hz I32-100/8000

heating generators. The plates are made from 3 mm thick, 2,000 mm long, 51-52 mm wide strips of steel U9. The use of the new process also makes it possible to eliminate blank heating in a gas furnace, free equipment and manpower, increase labor productivity by 2.5-3 times, and lay the groundwork for subsequent process automation. The anticipated economic impact nationwide is 330,000 rubles per year. Figures 4; references 3.

Rotational Forming of Annular Sectioned Parts

927F0323F Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 13-15

[Article by K.V. Ibragimov, Kazan Aviation Institute; UDC 621.984.8.002]

[Abstract] The process of making annular sectioned parts with a variable thickness by rotational forming from sheets is examined. The method amounts to gradual plastic deformation of a cylindrical blank by continuously rotating it in relation to deforming and sizing rollers evenly positioned along the blank perimeter whereby the part profile is formed by rolling the blank between the rollers. Rotational forming in this case combines forming to size and sizing (RPK) in a single device by means of rotational-radial expansion and forming to size. The task of RPK process design and the factors which must be taken into account, such as temperature conditions and rotational sizing and grinding, are outlined. The process requires electric contact heating of the part which is heated directly in the forming machine. The method and device for rotational-radial expansion and sizing of annular parts from cylindrical blanks with contact heating make it possible to perform several operations in the same production line with a single installation and make parts with constant or variable cross section contour thickness. Figures 2; references 5.

Grinding-Sizing by Rotational Expansion of Annular Blanks

927F0323G Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 15-17

[Article by K.V. Ibragimov, A.A. Razdaybedin, Kazan Aviation Institute; UDC 621.982.5:621.983.7.002]

[Abstract] An analysis of the shortcomings of existing grinding-sizing methods and possible procedures of grinding and sizing annular blanks led to the development of a new grinding-sizing method by rotational-radial expansion which amounts to radial flaring of the annular blank by rollers uniformly spaced along the circumference and its continuous spinning relative to these rollers. The method is realized in a rotational forming-to-size and sizing (RPK) machine. A schematic diagram of the annular blank grinding and sizing method and a loading diagram of the blank's circular outline are cited and the tangential deformation distribution in the ring cross section and the graphic behavior of the active blank curvature in the rollers and between them are plotted. The principal parameters which control grinding-sizing by rotational expansion is the distance between the diametrically opposite deforming rollers and the number of blank turns necessary for completing the process. The process stages are outlined in detail and the following advantages of the process are identified: a better quality and accuracy of parts; a lower level of straining forces; and the possibility to machine parts with different cross section shapes and a broad range of diameters. Figures 4; references 5.

Increasing Accuracy of Parts Made by Pipe Bending

927F0323H Moscow
KUZNECHNO-SHTAMPOVOCHNOYE
PROIZVODSTVO in Russian No 3, Mar 92 pp 17-18

[Article by N.V. Sosov, I.V. Skomorokhov, Kazan Aviation Institute; UDC 621.981.2.001.24]

[Abstract] The importance of the out-of-roundness (ovality) parameter of ready tubes for assessing the suitability of parts made by pipe bending and their capacity and service life prompted a study of the two principal methods used today for preserving the tube cross section shape during bending—by a device supporting the pipe wall from the inside and by a device limiting the pile wall movement in the expansion direction, i.e., an external limiter—and their shortcomings. The conclusion is drawn that in addition to ovality, the elastic springing back of the tube after the bending force is lifted must also be taken into account. It is shown that the difference in the bent pipe diameters can be completely eliminated by using a special profile gauge and by following a certain procedure. Experiments are conducted in a TGSP-40 bending machine with 40 and 50 mm bending radii to check these findings. Formulae are derived for calculating the effective spring back angle and the necessary forced unbending angle necessary for compensating for the ovality; these angles are used to determine the bending gauge angle which ensures a bent tube cross section with a zero ovality. Figures 2; references 1.

School's Contribution to Sheet Metal Stamping

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PROIZVODSTVO in Russian No 3, Mar 92 p 5

[Article by M.I. Lysov, I.M. Zakirov, Kazan Aviation Institute]

[Abstract] The work of the Kazan Aviation Institute (KAI) and especially its Aircraft Fabrication School (PLA) in the 60 years since the institute's founding are reviewed. The school's contribution to sheet metal forging and stamping is considered. Attention is focused on the development of theoretical premises of processes and facilities for plastic forming of thin-walled parts by plastic bending, bend-rolling, tensile bending, torsion, rotational forming by elastic media, and hardening. Production of original equipment for stretch forming developed in the 1940's, the development of bending presses in the 1960's, and research into CAD/CAM practices (SAPR) with automated workstations (ARM) in the 1970's are mentioned. In the eighties, much of the school's research was implemented in the press and die forging industry. In the past 60 years, graduate students and doctorate candidates produced more than 40 Candidate of Science and five Doctor of Science dissertations, dozens of monographs and teaching aids, and hundreds of articles.